JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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VOL. LXXIX., No. 2036.—TUESDAY, MAY 20, 1902.

EDITORIAL NOTES.

Fate of the New England Gas and Coke Company.

THE eyes of the gas-manufacturing universe are now turned upon Dr. F. Schniewind, of the New England Gas and Coke Company, of Everett, near Boston, U.S.A., in the expectation of hearing something from him, by way of a supplement to his Glasgow Conference paper, which shall explain the financial misfortune that has overcome the Company, as recorded in the "JOURNAL" for the 29th ult. Gas manufacture and supply is not a missionary enterprise; and when a Company established to work some particular industrial process is adjudged insolvent, the presumption is that the process is a failure. Dr. Schniewind has now the opportunity of showing cause why technical opinion should not pronounce judgment in this sense upon the enterprise for which he has made out so plausible a case—on paper. We have refrained from commenting upon this deplorable experience of the New England Gas and Coke Company, in order that any explanation which might be forthcoming of the circumstances, other than appears on the surface, might be the first to engage the unprejudiced attention of gas engineers, who are naturally deeply interested in the whole affair. The receiving order in the Company's case was made so long ago as the 7th ult.; and since nothing of the nature of the communication which Dr. Schniewind's auditory in two hemispheres are waiting for has transpired to throw further light upon the subject, judgment must go by default against this much-advertised venture.

Impressions as to the hopeless character of the Company's financial position and prospects will be deepened by the statement, which we gave on the authority of the "Progressive Age," that "Mr. Whitney's interest in the "enterprise is relatively small." There is a familiar proverb about the sagacity of rats as displayed by their leaving sinking ships; and inasmuch as Mr. Whitney's name and prestige were largely advertised in support of this Everett speculation when its potentialities were as yet untested, the circumstance of his strategic movement to the rear while there was time, is not reassuring as to the future of the concern. It is difficult, at this time of day, to resist the suspicion that Mr. Whitney must have had his own ideas regarding the subject, at the period when his chemist associate was interesting the technical world in his own view of the operations of the Company. Dr. Schniewind, at any rate, has been faithful to the last in upholding the reputation of the Everett undertaking; for so recently as March 20 he read a paper at the meeting of the Ohio Gaslight Association, in which he repeated all the claims already formulated respecting the advantages of the process followed in this enterprise, which was to pass into a Receiver's hands within three weeks. Let us recapitulate these, in order to keep the essentials before our readers. Dr. Schniewind repeated, on March 20, that the Everett process, employing a modified Otto-Hoffmann retort coke-oven, is based upon principles closely allied to those of ordinary coal-gas manufacture. Instead of the charges being a few hundredweights of high-grade coal, however, the retort coke-oven receives a charge of 16,000 lbs. of coking slack coal. From such material, the products obtained are: 75 per cent. of coke of a quality "very "much superior" to ordinary gas coke, 5 to 6 per cent. of tar, 1 to 1·25 per cent. of sulphate of ammonia, and 4000 to 5000 cubic feet of surplus gas per net ton, of 18 to 20 candle power, and approximately of 700 B.T.U. calorific value per cubic foot. The rest of the gas resulting from the carbonization of the charge, being of lower quality, is burnt in the retort coke-oven furnaces. The whole of the coke made is therefore available for sale. Dr. Schniewind assured the meeting that "the results which are obtained, especially at "Everett, Mass., in regard to the disposal of the large out-"put (of coke) have been surprising to all of us." There was apparently a greater surprise in store for the party.

In another passage of the paper, the author admits that the yield of gas from average coking coal with this process is only 9000 cubic feet per ton. If the first 4000 cubic feet of this yield are collected, the product is an illuminating gas of about 18 or 19 candle power. The rest of the yield shows about 8 to 9 candle power. Whether the failure is due to defective arrangements for the marketing of these products, or whatever the cause, the undertaking committed to the method is actually in the hands, as Receiver, of Mr. Robert M. Burnett, on the petition of creditors the chief of whom are the United Coke and Gas Company, who hold the Otto-Hoffmann rights in the United States, the Dominion Coal Company, and the town of Everett, for two years' unpaid taxes. In order to meet pressing claims, the Receiver has issued his certificates to the amount of $285,000. There is talk of "reorganization" in the air, with the object of preventing the works being shut down and providing money to carry on the business; but nothing definite has transpired respecting any such arrangement. The whole gas interest of Boston and the vicinity is in such a deplorably shaky condition, due to years of reckless competition and financing, that it seems doubtful where the money can be found for even a technically sound gas undertaking—to say nothing of an exploded experiment.

The whole story is highly illuminating upon the question of what is the prime object of a gas company's existence. Old-fashioned persons believe that it is to make and sell gas to the best advantage; and they are not likely to waver in this faith, after seeing what happens to a company which attempts to relegate gas making to the second place, and to make its chief concern the manufacture and sale of coke. We can claim for the "JOURNAL" whatever credit there may be in having demonstrated, years ago, that the comparison between ordinary gas manufacture and what was proposed to be done at Everett was just as broad as it is long. Therefore we might, were we so disposed, now cry, "I told you so!" which is the deepest satisfaction vouchsafed to the judicial faculty in man. But that is a tea-table exclamation at best. The worthier exercise is to carefully investigate the complex industrial and financial phenomenon now exhibited before the eyes of the technical world, and differentiate between the various distinguishable causes and effects bound up in it.

How does the example affect the position taken up by the President of the Institution of Gas Engineers the other day, that, assuming a satisfactory demand for retort-oven coke, any gas company might justifiably manufacture it? The answer depends upon the incidental factors of a gas company's industrial and financial constitution. Mr. Thomas Littlehales, who also had a paper on retort coke-ovens before the Ohio meeting, said, in the course of it, that, "given an outlet for coke," the operators of coke-ovens could profitably to themselves put gas into the holders of a gas company at a lower charge than the company could make it. But, surely, something else is needed to prove the case? Dr. Schniewind does not complain of any want of appreciation of the Everett coke in the local market—quite the contrary, indeed. Again, the simplicity and largeness of retort-oven carbonization naturally attract the mechanical tastes which most gas engineers entertain. Dr. Schniewind has therefore been able to enlist their sympathies when he talked about charging by truck-loads, and "handling" all the weights by means of electric cranes, electric pushers, and so forth. It was, as the French say, "all that there is "of the most choice" in regard to mechanical refinements upon the small and crude methods of gas manufacture. But it has all passed to the Receiver, as though it were no better than a vanity. At the Ohio meeting, there were some unconvinced critics both of Dr. Schniewind and Mr. Littlehales. One wanted to know if it was not true that beehive coke sells for from 40 to 60 cents per ton more than the retort-oven coke; and there was no answer, except that there is a "prejudice" against the latter variety. Another suggested that the retort-oven partisans have a way of comparing the best machine performance in the case of their plant, with hand-made gas, and not the best examples of that. Dr. Schniewind says his kind of carbonizing can be done for a labour cost of 22½ cents per ton. Alas! he only gets 4000 cubic feet of gas from a ton to charge it upon; and one

of his Ohio critics bluntly told him that on this ground he "failed to see where the profits came in." They do not; or that Receiver would have some other occupation.

The broad result of it all is that economies, whether of residual products, or labour, or capital, are and must ever be subordinate to the main consideration of what the chief business to be done really is. It is the business of a coke manufacturer to make coke, just as it is of a gas manufacturer to make gas. After he has "got home" upon his principal concern, it is his prudence and frugality to pay heed to economies of every kind; but he has to remember their cost. It is impossible to get something for nothing, even if it is a "residual." The utilization of every waste product costs something—not infrequently more than it is worth. This is the perfect and adequate reason, for those who are able to understand it, why the old beehive coke-oven holds its ground; and it must also serve as the reason why gas companies must continue to make the manufacture of gas to the best advantage their chief care—if they do not wish to be in danger of a Receiver!

Parliament and Trade Unions.

On Wednesday last, the House of Commons was invited, by Mr. Beaumont, M.P. for the Hexham Division of Northumberland, to declare "that legislation is necessary to pre-"vent workmen being placed by Judge-made law in a position "inferior to that intended by Parliament in 1875." By 203 votes to 174, the House declined "to commit itself to fresh "legislation on the subject of trade disputes until it is shown "that the existing law does not sufficiently protect workmen "in the exercise of their lawful rights." That 174 members of the House should have been found willing to vote in favour of the original motion, after hearing the speeches of the Attorney-General and the Home Secretary, is, perhaps, witness rather to the powerful influence exerted in the constituencies by the Trade Union leaders than to the wrong-headedness of those members. The debate has certainly served a useful purpose in drawing from Sir Robert Finlay so very clear a statement of the case as that he made out against any legislation on the lines of the Bill introduced recently by Sir Charles Dilke, but afterwards withdrawn; while the whole of the speeches delivered are well worth the perusal of those interested in the problem which grows ever more rather than less important—namely, that of the relations between employer and employed.

The speakers in favour of Mr. Beaumont's motion dwelt upon two points especially, neither of which has anything to do with the other. These are: First, the decision of the House of Lords in the Taff Vale case, that Trade Unions are liable to be sued for acts done by their officers within the scope of their authority; and, second, the judgment in *Lyons v. Wilkins*, in regard to picketing with peaceful persuasion. As to the first, Sir R. Finlay pointed out that all that the House of Lords decided was that the ordinary law of the land applied to Trade Unions as to everyone else in the country. That anyone should get up and gravely propose that a decision of that kind (which the framers of the resolution had the impertinence to describe as "Judge-made "law") should, in the interests of any body or bodies, however respectable and useful, is, as Sir Robert said, simply astounding—or it would be to those unacquainted with the every-day pretensions of Trade Unionists. That such a proposition should receive the support of lawyers like Sir Robert Reid and Mr. Haldane is really deplorable.

It was freely urged that, as the resolution implied, the Taff Vale decision was contrary to the intention of Parliament when the Trade Union Acts were framed. For this contention, Sir R. Finlay pointed out, there is no ground. What Parliament in 1871 did decide was that it was not desirable that the internal affairs of a Trade Union should form the subject of litigation. It was not intended that a Union should be incorporated, or that it could sue, or be sued by, its members. It was not intended, for instance, that a Union should have the right to obtain an injunction to restrain a member from disposing of his labour in contravention of the rules of the Union, nor that a member should have the right to bring a Trade Union into Court in order to have their domestic differences settled. In the words of Mr. Bruce, the then Home Secretary, it was intended "that the affairs of Trade Unions should rest entirely on "consent;" and in the 1871 Act, elaborate provisions were made to guard against the possibility of any litigation in connection with the affairs of a Trade Union, between the members, or between the society and its members. But all this had nothing to do with the case of wrongs done by a Trade Union to a third party—or, for the matter of that, by a third party to the Union, for it has never been decided that a Trade Union cannot, as a body, proceed against anyone doing it a wrong.

The Attorney-General quoted the action of the Trade Union in the case of *Quinn v. Leathem*—where the Union said to Mr. Leathem: "You must dismiss that man, be-"cause he does not belong to our Society; he shall walk "the streets for twelve months as a punishment"—as a specimen of the wanton tyranny which, if the law could not intervene, would occur again and again, and which, if Sir Charles Dilke's Bill became law, could be exercised with impunity; and Mr. Asquith interposed the remark that "no "one defends" the conduct of the Union in that case. The point is not so much whether anyone openly defends such conduct—and many a like action has been so defended—but whether everyone is desirous that Trade Union tyranny of that description should be punished. Mr. Asquith knows quite as well as we do that this is not so. As to the question of picketing, with "peaceful persuasion," the Attorney-General asserted, "without fear of contradiction, that peace-"able persuasion never imposed any liability, either civil "or criminal." But it does not follow, he added, that immunity is to be extended to peaceable persuasion accompanied by acts which constitute a nuisance at common law. What has had to be dealt with in cases where this question has arisen was not peaceable persuasion *per se*, but peaceable persuasion coupled with watching and besetting the premises of the person affected "Peaceable persuasion, "though innocent itself, is not so meritorious as to afford "relief from the consequences of a wrong done at the same "time, and that has been laid down in the case so often "referred to"—namely, *Lyons v. Wilkins*.

It is a remarkable thing that the supporters of Trade Unions should come to Parliament with a request for an amendment of the law, without first carrying a picketing case to the House of Lords; the appeal in *Lyons v. Wilkins* having been abandoned on advice. Several members urged the Government to grant an inquiry into the questions raised; but, as the Home Secretary pointed out, they did not give a single instance in which, on the merits of the case, there had been any decision with which fault could be found. In view of the Government's promise to grant an inquiry so soon as the Trade Unions, after taking a test case to the House of Lords, should show that the law was in a condition which was unfair to the working classes, it is rather surprising that the motion was pressed to a division. Sir Henry Campbell-Bannerman spoke of the Government as "blind to the state of feeling in the country," and of the "very strong sentiment existing on the subject." This is the usual clap-trap of the party politician playing to the gallery. The really strong feeling in the country is rather one of extending distrust of Trade Unionism, and of fear lest its restrictive tendencies may prove a fatal handicap for our industries in the growing competition with foreign nations; and it will need much clearer evidence than is yet forthcoming to persuade the thinking members of the community that there is any good reason for exempting Trade Unions from the liability to conform to the common law of the land. Certainly, no case whatever was made out for that proposal last Wednesday.

Reported Cessation of Flow of Texas Oil-Wells.

A very startling piece of news recently appeared in the "Standard" and some other London newspapers, whence it was extensively copied, to the effect that the Texas oil-wells had stopped gushing, although the oil still flowed abundantly when pumped. So grave a report naturally created considerable commotion among the followers of the various interests that have centred upon the new petroleum field. It has since been contradicted; and in another column we give the substance of what has transpired respecting the actual condition of the wells, and of the adoption of their product on a large scale by the United Gas Improvement Company. We should not care to be positive as to what is the real truth of the Texas oil situation. So far as the English market is concerned, the trade from this field has been taken up by the "Shell Transport" interest, which has hitherto been identified with Borneo oil. It is as gas oil, for use in carburetted water-gas plant, that these so-called fuel oils come to England; for nothing

else. Doubtless the Shell Transport people found Borneo a far cry from Beckton; and they turned to Beaumont with a feeling of some relief. It has been reported by the British Consul, however, that the Texas oil supply is scarcely as yet in the stage of commercial development. It will be observed that even the United Gas Improvement Company's dispositions in regard to this source of crude oil are very much in the future. It would be a deplorable thing for the State of Texas if the newly-found oil should sulk in the bowels of the earth, and refuse to come out except under compulsion. Its quality is not so high as to warrant the expenditure of too much money and labour upon it.

For some time to come, therefore, it appears to a disinterested observer that the correct attitude of consumers of fuel oil, or gas oil, in relation to the Texas field will be one of strict reserve. If the product is worth transporting across the Atlantic, and really convenient arrangements are made for keeping up a regular supply, well and good. It scarcely appears at the present juncture, however, that to make a contract for five years or so ahead is likely to ensure getting the oil contracted for. Whatever may be the precise degree of importance attaching to the "Standard's" news, its very publication must serve to remind petroleum speculators of the essentially slender thread by which they hang on to prosperity. Reliability is apparently the one quality which the best-behaved fuel-oil field does not possess. The oil may be here—or there—to-day, in embarrassing profusion, overflowing the country side, and creating a perfect nuisance by its inconsiderate generosity. But it may be gone to-morrow, before all the arrangements necessary to put it upon the market are half completed. One cannot but sympathize with the "Shell "Transport" interest, which doubtless found it would not always pay to bring low-class oil all the way from Borneo to England, and hoped to find salvation in shipping something, not very greatly inferior, from the nearer Texas field. Are these hopes for ever blighted? It is impossible to say. All that the impartial gas manufacturer need think about is the many slips that intervene between the original "find" of oil and its supply to him as regularly as his own country's coal. Petroleum is volatile stuff, in more than one sense of the word; and while it is undoubtedly qualified to render valuable assistance in certain circumstances to the gas manufacturer, he would be rash who should trust it too far.

Cost and Price of Gas Supply for Power Purposes.

In discussing last week the reduction of the price of gas sold for power purposes in Manchester, passing reference was made to the existence of an undiscovered minimum of charge at which such a demand might be supplied. We stated that a business of this kind could probably be done at from 1s. to 1s. 6d. per 1000 cubic feet of gas, in many localities where the price to consumers for other purposes stands at double the money. So far as we are aware, this was the figure named in connection with the competition into which gas-supplying local authorities in the South Staffordshire region might expect to be forced by the Mond Gas Company. No gas manager, however, has hitherto undertaken to state the figure at which an increased demand for all-day gas, required in considerable bulk for generating motive power, and amounting (say) to 10 or 20 per cent. of the previous output, could be priced without loss. It would be an interesting return to get out. Meanwhile, as we also remarked last week, the pace of the demand for distributed power is being forced by the electricians, who are offering electricity for this purpose at anything approximating to one-third the price of the light current.

It is hardly possible that they can afford this sweeping reduction. Allowing 6 per cent. on the capital expenditure in the case of municipal concerns, and 7 per cent. to companies, an electrical contemporary makes out that the average total cost in 1901 for the former came to 4d. per unit, and for the latter to 5·7d. per unit. Yet offers of electric power at 2d. per unit are common. How is it done? Of course, the reply would be that, although this low quotation does not actually cover the works cost of the unit in most places, yet if a sufficient amount of business can be secured on these terms, the "diversity factor" will eventually come into play, and the branch will pay. We should say it is very doubtful, in the majority of instances. But still it is an experiment well worth trying. The undertakings which make the boldest bid for custom in this way probably escape much loss through the smallness of the demand; and in any case the demand for distributed power is not, and cannot be, very large, even in the most pronounced industrial centres. Nevertheless, it is a department that ought to be cultivated more than it is. Factories may be attracted by cheap power, and then they will want lighting; and gas light and power go together as naturally as electric light and power.

Arsenical Malting Coal.

Gas managers troubled with accumulations of coke by reason of the "arsenic scare" would be more than human if they did not feel some slight gratification upon learning that coal dealers are not wholly exempt from the same plague. There was a curious, and probably unprecedented, case of the kind at the Ipswich County Court last week, when the Judge decided that a firm of maltsters need not pay for a truck of malting coal which was found to be arsenical. The facts were simple enough. The coal merchants had been in the habit of selling to their maltster customers a particular description of Welsh coal for the purposes of their business; but one truck of this special coal was discovered to be pyritical, and upon analysis was found to show arsenic. The buyers' foreman said that when a portion of the coal was used "a foul smoke arose, "accompanied by a bluish hue, and the workmen expe-"rienced a tickling sensation in their throats." This is the first workmanlike account of the burning of arsenical fuel for malting purposes that has come under our notice; and it is only right that it should be recorded.

The broad facts appeared to be, however, that the arsenic scare was at its height; and this particular truckload of coal was perhaps unusually pyritical, which attracted attention. At any rate, the County Analyst, upon viewing the coal, did not like its looks; and found in the denser pyritica portions selected for examination as much as $\frac{1}{8}$th of a grain of arsenic per pound. The other portions of the coal contained only $\frac{1}{50}$th of a grain of arsenic per pound. The old difficulty of striking the average arose, of course; and the Analyst could not say positively how much arsenic ran to the pound of the whole truckload of coal. The Judge, however, made short work of all quibbles, holding that the coal, being arsenical, was not reasonably fit for the purpose for which it had been purchased, to the seller's knowledge. Judgment, accordingly, for the defendants, who had rejected and declined to pay for the coal; but, in view of the public importance of the case, plaintiffs were given leave to appeal. It is possible, therefore, that more may be heard of the matter, inasmuch as the reputation of a description of Welsh coal is at stake. The incident goes to show that there are other doubtful fuels in the market besides coke, which is not necessarily arsenical at all.

A Claimant for Honour and Payment.

A letter on the above subject, by Mr. D. Edwards-Radclyffe, came to hand on Saturday morning as we were preparing for press, earlier than usual in view of yesterday's Bank Holiday. Fortunately, the letter does not require any extended comment from us; and we merely direct attention to it here, in order that readers who are interested in the matter may not overlook it. Anyone who has followed the "Correspondence" and comments will be able to form a pretty correct judgment as to Mr. Radclyffe's title to payment from Mr. Livesey's Guarantee Fund, which was subscribed entirely by gas undertakings. If recompense is deserved by Mr. Radclyffe, then we are afraid he is looking to the wrong quarter for it; and his friends in the incandescent trade should see to it that he does not suffer any loss of reward by themselves subscribing the amount to meet his "substantial" claim.

Relics of the Past.

Notwithstanding the fact that everywhere the tendency is to progress, and to improve to-day upon the ideas of yesterday—or, perhaps, indeed, because of this—it is always most interesting to see pictures and descriptions of gas-works appurtenances of past days. We never turn over the pages of volumes of the "Journal" published years ago, without our attention being arrested by something or other to which the experience of later days lends an added interest. But, complete as is the record furnished by our volumes of the doings of the gas industry during the past

fifty years and more, there are many of our readers doubtless who could furnish us with photographs and sketches of bygone gas-works plant, &c., with which at all events a large proportion of the younger generation are unacquainted. About this time last year, Mr. Leonard G. Hall, of Rhyl, kindly furnished us with an illustration of an old central-column gasholder which was originally in use at the Boston (Lincs.) Gas-Works; and to-day we are able, through the courtesy of Mr. Walter T. Tew, of Warwick, to reproduce photographs of two gasholder houses which (though now, of course, used for other purposes) are still the same from an exterior point of view as they were many years ago, when each contained a holder 30 feet in diameter by 12 feet high, and a tank of cast iron, built entirely above the ground level. In the letter which accompanies the illustrations, Mr. Tew remarks that after seeing these gasholder-houses many times a day for many years, it has at last come to his mind that to other men the views and description of the buildings might prove interesting. They certainly will; and we would express the hope that others of our readers who may be in the same happy position as Mr. Tew, of having antiquities (or photographs of them), at their works or in their personal possession, will follow his excellent example and forward them to us, that they may be published for the benefit of their fellow engineers and managers.

The Metric System in the Gas Residuals Trade.

An instructive fact has come under our notice in connection with the German trade in nitrate of soda, which, as our readers will be aware, has lately been greatly disturbed by the failure of a large firm of Hamburg importers. It appears, in the report given by a contemporary, that the spot price of nitrate in Hamburg fell 2 marks per 50 kilos. in consequence of this failure, which threw a large quantity of this fertilizer on the market for resale. If there is one tale that is dinned into the ears of the British trader more than another, it is that of the disadvantage under which he suffers himself to lie by refusing to adopt the metric system of weights and measures. For some inscrutable reason, it is assumed by all these gratuitous advisers of the British merchant and manufacturer that he would sell his commodities more readily if he would fall into line with his Continental rivals in this regard. It was even urged the other day in our columns that, for the sake of uniformity, gas should be sold by metric measure. It is very rarely mentioned by the paper advocates of the metric system that where it is supposed to be popular the people only get along with it by dodging the decimal subdivisions, and trafficking in the more convenient but quite unorthodox aliquot parts of the unwieldy metric units. Here is a very striking example of the practice. Why should nitrate of soda or sulphate of ammonia be quoted by the 50 kilos.? It is a highly illogical quantity, the chief merit of which apparently is its practical convenience, in being very nearly the same as our despised British hundredweight. What advantage the German merchant derives from quoting nitrate or sulphate at per 50 kilos., instead of per hundredweight, is one of those practical puzzles which business men do not trouble themselves to solve, but which lie at the root of all questions of weights and measures that are not purely academic.

Bradford's Conversion.

The conversion of the City Council of Bradford from a system that has in the past certainly created for the gas consumers a burden which in justice they ought not to bear, appears to be somewhat slow. We refer, of course, to the practice of charging a portion of the community—namely, the gas consumers—with the cost of lighting the streets for the benefit of the whole of the citizens. It is true that the Council some months ago agreed that this principle was wrong, and that it should in future be altered; but now that the time has come for setting aside the amount required for the purpose (£31,000), some hesitation is perceptible. Good resolutions are of little avail unless they are carried into effect; but as the majority of the Council are still of opinion that the change is desirable, the gas consumers may be congratulated on the relief which is in store for them. The consumers have already done vastly more than their share—even if it be admitted that they ought to do anything at all in this direction—towards helping the rates; for at last week's meeting of the City Council it was stated by the Chairman of the Gas Committtee that the department has contributed no less a sum than £880,000 for this purpose. This, of course, includes £421,000, the cost of street lighting since the abolition of the lighting rate. Assuming that a reduction of 1d. per 1000 cubic feet in the price of gas makes a difference in revenue of about £7000, at the present rate of consumption (and in past years, therefore, it represented a much smaller amount), some idea may be gathered of the extent to which the price has had to be unnecessarily kept up, in order to assist the pockets of the ratepayers in general. The situation is, however, not without its humorous side; for one can imagine the grim satisfaction of the non-gas consumer when reflecting that his (perhaps much detested) neighbour, by burning gas, is helping to pay his rates. Now, however, the gas consumer is to have his turn; for there will be a reduction in the price of gas next July, providing the Finance Committee agree to pay the estimated cost of street lighting for the year.

Municipal Financing.

Plymouth seems bent upon proving how utterly worthless are all the checks invented for keeping municipalities from straying from the straight paths of good financing. In the autumn of last year, the new Borough Treasurer presented a report to the Corporation upon the serious position into which their affairs had been allowed to drift, and held out solemn warnings of the consequences which must ensue if drastic reforms were not quickly effected. One of the practices of the Council which he most strongly condemned is that of charging capital expenditure to suspense accounts. In some instances the Corporation have obtained sanction to borrow money for improvements, but instead of raising a loan in the usual way, they have returned the sanction to the Local Government Board to be cancelled, and have proceeded to draw on their bankers for the money. This has been done in order that the authorized town debt might be kept within the statutory limit. The Borough Treasurer pointed out that this is not only illegal, but is an extravagant and ruinous method of financing. Under the pressure of his advice, the Council decided that the whole of these suspense accounts, amounting to some £25,000, should be treated as one item, and be paid off by three equal annual instalments. This was six months ago. But last week, by a majority of about three to two, it was resolved to extend the period of repayment from three to five years. The Chairman of the Finance Committee, and others who take a strong view of the Corporation's financial position, protested in vain against this further sacrifice of principle to expediency. They warned the members that the inevitable effect would be to increase the rates in future years, while it would embarrass the Corporation in regard to certain pending applications for further borrowing powers. The majority were deaf alike to protest and warning. The temptation to raid this fund, to avoid an immediate increase of the rates, was too great to be resisted. It was possible to keep down the rates by a penny or perhaps twopence in the pound; and to obtain this doubtful advantage, Plymouth was plunged a little deeper in the financial morass in which Progressive municipalization has landed her.

Damage to Pipes by Traction-Engines.

Whatever may be the result of the appeal in the case which recently came before the Judge at the Watford County Court, as reported in our "Legal Intelligence," it would seem that Sir Alfred Marten only did justice to the Colne Valley Water Company in giving them the amount they claimed as compensation for damage to their pipes by the passage over them of a heavy traction-engine. Gas and water companies lay their mains at such a depth as to be unaffected by ordinary traffic, or by the meteorological conditions usually prevailing during the winter. If the latter happen to be exceptionally severe, and the pipes suffer from the effects, water companies are put to the expense of repairing them, or even laying them at a greater depth. This is an *actus Dei* for which no one can be blamed; and the owners bear the penalty. In the case in question, however, the damage was caused by an act of man. The mains had been properly laid, but they were found to be broken by the use of a traction-engine, weighing upwards of 13 tons, for drawing trucks each weighing some 5 or 6 tons. The element of danger had been brought into a place where its presence had been detrimental. The Company contended, and rightly, that the weight of the engine was excessive, having regard to the traffic for which the roads were con-

structed and adapted, and for which their pipes were laid. The defendant claimed the protection of the Locomotives Act, 1898, which, it was urged on his behalf, relieved him of liability, inasmuch as he was using the highway in a perfectly lawful manner. His Honour was unable, from a study of the wording of the Act, to admit the justice of the claim; and it will be interesting to see what view the Judges of the Superior Court take of the matter.

Retort Heating by Producer Gas.

In the course of the discussion (a condensed report of which we now publish) on Mr. F. J. Rowan's recent paper to the Institution of Engineers in Scotland, both Mr. W. Foulis and Mr. Alexander Wilson were able to speak to a lengthy experience of the use of fuel gas for retort-heating purposes at Glasgow. The latter gentleman stated that at the Dawsholm Gas Works there were more than 200 producers, though many of them were small; while Mr. Foulis said that at the new Provan Gas-Works the whole of the retorts are to be heated by means of producers placed outside the retort-house. In Mr. Foulis's opinion, no one having experience of heating by gas would ever go back to open fires; and he has no doubt whatever that gas will be the fuel of the near future, One of the speakers complained of tar gathering in the valves of engines to which producer gas was supplied, especially when gas coke was employed; but Mr. Foulis pointed out that this could easily be obviated by passing the gas through a washer, and washing it with water.

Newspaper Clippings.

A critical newspaper reader with special knowledge of (say) a particular line of industry, occasionally meets with statements in the general press concerning matters with which he is cognizant, which prove to him that the sageness of the world is not all concentrated in the brain of the newspaper writer. Here is a short clipping from the "Darlington Times" which alone condemns the writer's knowledge of the subject he presumes to deal with: "The "time," he says, "has not been reached when employees "may participate in profits, as mooted at the last meeting of "the North of England Gas Managers at Newcastle; otherwise those in charge of responsible works might have the "opportunity of reaping the reward of their shrewdness "and industry." The writer of these words was treating of Ripon gas affairs; and this reference to profit-sharing has, so far as we can discern, not even the remotest connection with the topic to which he had set his pen. However, it discloses his ignorance; and perhaps, if his attention is called to the matter, he will at once take steps to add to his stock of facts. It is true that profit-sharing has not been generally adopted in the gas industry in the particular form he has in mind; but there are some good examples. We would recommend this disseminator of unsubstantiated views to apply to the South Metropolitan Gas Company for particulars as to what has been done there in the matter of profit-sharing. When he learns of the thousands of pounds of capital which the workers of the Company hold, and of the thousands of pounds which they have drawn in the way of bonus—without affecting the dividends of shareholders, and with a price for gas the lowest in London—he may perhaps alter his opinion that "the time has not been reached when "employees may participate in profits." Several great concerns, too, in other branches of industry, could tell him a tale equally favourable to profit-sharing; and they, and the gas undertakings who have adopted the system, find that the money benefit to the employee does not by any means sum up the advantages which proceed from the system. This paragraph has already extended to greater length than intended; but there is just one other clipping—this time from the "Daily Telegraph"—which is worth publishing. In one of the leaders in that paper last week appeared this wise sentence: "No statesman has ever disputed the fundamental viciousness of a system which gives to one class "the right of voting and spending money, and imposes "upon another the burden of contributing the rates." It would be interesting to see an article by the author of this statement on the subject of a system which gives to one class large benefits towards the obtaining of which they have not contributed, and imposes upon another class (known as gas consumers) the burden of supplying the money which produces those benefits. We are inclined to think he would find a little "fundamental viciousness" about this system too.

Departmental Interference and Parliament.

It has been a matter of complaint for some time past that there is a disposition on the part of Government departments to extend their power beyond reasonable limits. It is not a great while since that comment was made in these columns on what appeared to be a senseless piece of officialism, when a certain local water authority had a proposal to construct a circular reservoir vetoed by a Government Department, because it did not please an Inspector, who probably had never had anything to do with building a reservoir in all his professional experience. It seems, from little pieces of information which now and again drop, that in connection with Private and Local Bills, the reports of departments containing recommendations and observations on the provisions of the measures are tending to become more and more embarrassing. This must throw increased work and responsibility on Select Committees, seeing that it is their duty to notice all such recommendations in their report to the House, and state their reasons for dissenting if the recommendation is not agreed to by them. Departmental reports ought to be so framed as to be useful to the Committees for guidance; but, when they exceed moderation, then they must be harassing rather than helpful to them. That they are ofttimes of this character is shown by the fact that the reports of Committees frequently bear witness that they have not adopted the recommendations of the departments. It was once said, "Thank God there is a House of Lords;" and promoters of Private Bills may now say with equal fervour, "Thank God there are higher "authorities than the Departmental Boards."

An Example.

Though not a Gas Bill, we may refer to the example afforded by the Huddersfield Corporation Bill, which was noticed in our "Gleanings from the Committee Rooms" last week. Although this Bill had nothing to do with the gas supply, its primary clauses had connection with the water-works and education; and what happened in connection with it might occur in the case of any gas or other measure. The Bill, it will be remembered, by the time it reached the Commons Committee who were to consider it, had been relieved of all external opposition; and, in the ordinary way, the simple duty of the Committee would have been to refer the Bill back, with a statement of the facts, to the Committee of Selection, who would have dealt with it as an unopposed Bill. But, owing solely to the objections of Government Departments, it was necessary for the promoters to lay their case before the Committee. The Local Government Board, it appears, were disposed to prevent the continuation to the Council of certain powers which Parliament had previously bestowed upon them. The Corporation, it will be recollected, have met with sheer bad luck in connection with the construction of certain reservoirs; and it would have been decidedly unfair to saddle them and the ratepayers with an unnecessary burden. After hearing the evidence for the promoters, the Committee declined to allow Parliament to be superseded by the Department so far as the Commons are concerned. Then the Education Board (acting, it is said, rather on behalf of the Charity Commissioners than of education) tried to obstruct secondary education being given at the Borough Technical College, lest there should be competition with two or three grammar schools. People familiar with the local conditions assert that the position of the Commissioners is absurd; and therefore the former are elated to find that the Committee disregarded the Education Board, and accorded the Corporation the fullest freedom. Perhaps the departments will endeavour to influence the House of Lords; but, if they do, locally it will be almost generally hoped that they will meet with as little success as they have done in the Commons. As far as we can judge, the questions involved are distinctly of a kind that can be settled directly between the authority representing the local interests and Parliament, without the interference of any intermediary body. If the liberties of Government Departments were a bit more circumscribed, no harm would result to anyone.

Mrs. CATHERINE KING died last Tuesday, at her residence, Brixton Hill, Surrey, aged 82. The deceased lady was wife of Mr. William Boughton King—the successor of the late Mr. Thomas G. Barlow in the editorship of the "JOURNAL," a position which he held until his death in 1878—and mother of the present Editor and Publisher, Mr. Walter King.

WATER AFFAIRS.

The Progress of the Water Inquiry.

THE crowded state of the corridors leading to the room in which the Joint Committee on the London Water Bill deliberated, on Monday afternoon last week, over the evidence submitted to them in support of the plea for a reconsideration of their remarkable resolution of the 30th of April, by which they knocked to pieces at one blow the scheme of representation on the proposed Water Board embodied in the third schedule to the Bill, testified in the most unmistakable manner to the keenness with which the decision on the point was awaited. The Committee met at one o'clock, and sat with closed doors for an hour and forty minutes. The interval afforded a good opportunity for speculation as to what the result would be—the general opinion being that the Committee would give way. When the door was at length opened, there was a rush for it such as one was familiar with at the pit entrance to a theatre before the adoption of the *queue*. It was excusable, however, all things considered. The parties were not kept long in suspense. As soon as silence had been obtained, Lord Balfour made the announcement given in the "JOURNAL" last Tuesday—that a motion submitted to the Committee that their decision of the 30th of April should be adhered to had been lost on an equality of votes, in accordance with the rules of the House of Lords governing Committee proceedings. Consequently, the schedule would stand intact until it came to be considered in due course after the clauses. The exact effect of their Lordships' decision did not at first appear to be understood; but a few questions by Mr. Balfour Browne elicited answers which elucidated the matter. Of course, the Committee were well advised in regard to the precise form of procedure to adopt in the circumstances; but one would have thought, as the learned Counsel suggested, that the motion to be voted upon would have been one of rescission rather than adherence. The Chairman explained that the Committee's resolution was not an amendment of the Bill—that no amendment had, in fact, been made. Mr. Balfour Browne was answered, but not satisfied; for the next morning he asked if he was to understand that the schedule had been demolished, and would have to be re-established. He then received the assurance that it had not; and there the matter was allowed to rest.

The sittings of the Committee last week were devoted to the consideration *seriatim* of the clauses of the Bill. The first material change in the text was made on the initiative of the London County Council. Under the Bill, as introduced, the Water Companies were to receive, in consideration for their undertakings, a certain amount of water stock. The Council have, however, always contended that the purchasers should have power to make payment in cash; and one of the clauses of their Purchase Bill now before Parliament provides for this, and for the allowance of "such "further sum" as may be awarded "to meet the cost of "re-investing the money." Mr. Freeman therefore, on their behalf, asked the Committee to amend the Bill in this respect. Mr. Pember suggested that the Companies and the Local Government Board might come to an agreement as to the exact wording of the clause dealing with this matter. He urged the retention of the system of payment specified in the Bill; and he submitted a revised clause in which the words "compensation for the loss of" were substituted for "consideration for." After a deliberation in private, the Committee accepted this verbal amendment; but at the same time they yielded to the entreaties of the County Council by sanctioning payment in cash, with power to the Water Board and the Companies to come to an agreement as to taking it wholly or in part in water stock. This decision is on the lines of the report of Lord Llandaff's Commission. It was therein specified that the purchase price was to be "payable in cash at the option of either the "vendors or the purchasers;" but, by agreement, the former might be "paid in the stock of the Board."

The next matter to be considered was the position of the Local Authorities in the outlying rural districts of the Metropolis. It was urged, on behalf of the London County Council, that these places should either be kept outside the water area or be compelled to remain within it. Under the Bill, an option is given to them in this matter, which it was thought would lead to confusion. The Council, however, had no authority to take up the case of these bodies; and so far as Hertfordshire and the rural districts of Essex are concerned, they are in favour of the Bill as it stands. According to its provisions, they will be able to get a supply of water in bulk; and the Committee declined to make any amendment. Financial matters then once more occupied attention, on the clause providing for the substitution of water stock for the irredeemable debenture stock now in existence. On behalf of the Water Companies, Mr. Claude Baggallay contended that the proposed conversion was unprecedented. But Mr. Fitzgerald pointed out that, in its changed form, the stock would be more readily marketable, and would command a higher price from the fact that it would have behind it the security of the rates. Moreover, the stockholders would have their income assured for sixty years. The arguments of the learned Counsel satisfied the Committee, who declined to alter the clause.

The record of last week's proceedings must not close without reference to an incident which at one time seemed likely to give rise to unpleasantness. Every advocate necessarily does his best for his client, whether he be plaintiff or defendant; and most people whose business it is to follow proceedings before Parliamentary Committees or in the Courts know how to appraise at their real worth many of the uncomplimentary remarks which Counsel, in the warmth of argument or in the process of sharp cross-examination, consider it to be their duty to indulge in. They do not always display the quality once attributed by Othello to Iago, of weighing their words before they give them breath; and it does not do to take them too seriously. It was perhaps a little injudicious on the part of Mr. Fitzgerald, in his anxiety to carry his Bill through, to couple the Water Companies and the London County Council together, as he did on Tuesday afternoon, in an agreement to frustrate his efforts; and it very properly called forth an indignant denial. Colonel Lockwood and Mr. Boulnois, Chairmen of the East London and West Middlesex Water Companies, were naturally greatly aggrieved at the imputation that they and their colleagues were in league with Spring Gardens to wreck the Bill; and they submitted to the Committee, through Mr. Pember, that there should be either re-affirmation or apology. Mr. Fitzgerald referred to the matter on Friday morning, and acknowledged that the words "wreck the Bill" had a nasty ring in them; but he pointed out that he did not use them. However, he expressed his willingness to accept the assurance of the other side that the inference he had drawn was a wrong one, and that the Council and the Companies were agreed that the Bill should become law. With regard to the two gentlemen named above, he added that nothing had been farther from his mind than to cast any reflection upon them, or upon the County Council.

Colliery Workings under Reservoirs.

Mr. Justice Swinfen Eady has just delivered judgment in a special case stated for the opinion of the Court, which deals with a point of considerable importance to the owners of water undertakings. In 1856, certain land was conveyed by Viscount Cardwell to the Wigan Corporation, for waterworks purposes; but there was no conveyance of minerals under the land. Later on, the Viscount demised to certain lessees all these minerals; but the lease provided that they should not in any way interfere with or prejudicially affect the reservoir above them belonging to the Corporation. In due course, the lessees (the Wigan Cannel Colliery, Limited) served notice on the Corporation of their intention to work the mine under the reservoir; and thereupon the latter body intimated their desire to acquire the mine. The question of compensation was left to two Arbitrators, who, however, failed to agree; and Mr. A. H. Leech was called in as Umpire. The main questions submitted to the Court were whether, upon the true construction of the lease granted by Viscount Cardwell for the working of the minerals, the "interference" referred to was damage, &c., caused by surface operations only, or whether it included damage arising from underground operations; and, if underground as well as surface operations were included, then whether the Corporation were entitled to the benefit of the proviso. Mr. Justice Swinfen Eady, in his judgment, held that the lessees were not bound to leave any support under the reservoir; and that, even if there were such an obligation, it would not affect their right to be paid for all the coal required to be left for this purpose. The Corporation doubtless thought they were amply protected by the clause referred to in the minerals lease; but in this they have unfortunately proved to have been mistaken.

ESSAYS AND REVIEWS.

SOME RESULTS OF AMERICAN GAS-WORKS ADMINISTRATION.

In the articles lately published in the "Journal" describing the organization of American Gas Companies, it was made apparent that the merits of the system depend a good deal upon the manner in which it is worked. If the system facilitates the promotion of good administrators to power when the general body of proprietors of a Company desire this result, the device by means of which it can be brought about—the direct annual election of the whole board of directors and the president and other principal officers in general meeting—equally favours the revolutionary movements so notoriously frequent in the history of American gas companies, which ensue upon the transfer of the majority vote from one set of proprietors to another. It is only for fresh hands to secure by any means the control of the majority vote, by however small a margin, to give them supreme power over the administration, the finances, and everything connected with the undertaking. The tyranny of the majority is absolute, and it need never be long delayed in operation. There is no necessity for making representations to the existing board, or anybody else, when a complete change of direction and administration is desired. All that is needful is to obtain legal possession of a sufficiency of stock, of which one unit always carries one vote, and the wielder of this power can change everything at the next annual general meeting. Usually, this operation is the prelude to a stock-watering operation, for the benefit of the new proprietary. Consequently, there is steady pressure always operating upon the authority in possession to do the watering themselves, in advance, in order not to attract the cupidity of those outsiders who would do the same thing if they had the same chance.

Such a catastrophic system of gas-works administration seems to lack recommendation from the point of view of the public and of the consumer, who can never hope for cheap gas through the operation of such causes and influences as operate to this end in the case of every British gas undertaking. Consequently, the American citizen is driven to protect himself by the harshest and apparently the most reactionary special legislation, ordering that the price of gas in a particular city shall not exceed a fancy figure. This necessity accounts for all the "dollar gas" legislation of the United States; the figures being merely the well-known reflection of the unit of currency. It is a round number, easy to deal with; and it strikes many gas reformers in the Eastern and Middle States as fair and reasonable. It is not for us Englishmen, who have experienced such difficulty in determining fair and reasonable initial prices under the sliding-scale, to cavil at the mistakes occasionally made by American legislatures in fixing the much more delicate matter of the actual selling price of gas in a locality, out of which, by good management, the providers may expect to make as much profit as they deserve. For reasons already hinted at, it would be absurd to have regard to the rate of dividend in fixing these selling prices, so much of the capital being commonly unrepresented by assets of any kind, tangible or intangible.

The ordinary American business man has usually at his command another remedy against any gas company which "pulls the string too tight." He can form another company, and either make a "deal" upon the basis of the new franchise, when obtained, or try what he can make out of competing with the old concern. Obviously, all parties are equally exposed to the vicissitudes of their joint-stock system, already explained; so that the most daring of gas "pirates," unless strong enough to hold the majority of the new stock himself, which is not often the case, may suddenly find himself outvoted and stranded in the midst of his career. There is never any knowing who is the responsible party in these affairs at any given moment. Everything up to a point may be put forward in the name of a particular speculator, only for it to be disclosed at some critical juncture that that gentleman's interest in the business is "relatively small." Meanwhile, it is usual for reprisals to go on until the unfortunate *corpus vile* of the gas undertakings of a district which has been "struck" in this way will not be worth fighting over. This is actually the case of Boston at the present time, and not of Boston only. The fiercer the fighting among the "pirates" for the booty, the stronger the temptation for the Legislature to "dish" them by lowering the price of gas compulsorily to the vanishing point of profit. This is a remarkable consequence of the apparently innocent rule that the whole direction and administration of a gas company can be changed annually by a simple majority vote of the proprietary; but so it appears to be, in unbreakable sequence.

The only point we desire to make here in connection with this aspect of the American gas question is, that all this financial licence and legislative stringency help to put a premium upon skilful management. When a gas company which has for years been jogging along in the height of comfort and imagined security by favour of a charge of $\$1\frac{1}{2}$ per 1000 cubic feet for any sort of gas, is met with the emergency of having to face ruinous competition, or accept a legislative obligation to sell gas of fair quality for 60 cents per 1000 cubic feet—which is, roughly speaking, an actual case—something must be done. What the gas company did herein was to send for the best engineer available, put the case to him, ask him to look into it, and see if it might be possible to live under the proposed terms; and when he said he believed he could do it, they let him try, for any recompense he chose to ask. This is one of the jewels brought by adversity into deserving hands. Of course, the same quality of ability which is demanded for the defence is often to be enlisted for the attack; so that, on one side or the other, a competent American gas engineer of administrative ability usually has more than one lucrative engagement on his hands.

A glimpse into the arcana of American gas company finance is afforded by an article of Mr. R. R. Bowker, originally contributed to the "Atlantic Monthly," and reprinted in the winter issue of "Municipal Affairs." How such a heavy composition ever got into a magazine generally supposed to be full of light and amusing reading is a mystery to anyone acquainted with the editing of English periodicals. It must perhaps be taken as a proof of the severity of the tax which the "trust" system is bringing upon American life, that the subject cannot be kept out of what would ordinarily be light reading intended to while away an idle hour. This is the remarkable outcome of the vicissitudes through which the gas supply of New York has passed, as summarized by Mr. Bowker by way of introduction to his article: "The surface railway facilities in New York (boroughs of Manhattan and the Bronx), and its supply of gas and electricity, are now in the hands of two great Corporations, behind which is one group or alliance of men. These Corporations represent an actual outlay probably well within $125,000,000, for systems which could be replaced to-day, probably, for less than $100,000,000; while their nominal capitalization, share and loan, excluding securities of consolidated companies held in the treasury of the controlling Company, is over $300,000,000, and the market value of their securities is above $400,000,000." How all this came to pass would easily fill volumes; but it is possible to give a synopsis of the story, especially so far as the gas supply is implicated.

It is, to begin with, a striking commentary upon the elaborate provisions under which, as recently narrated in these columns, American joint-stock companies are organized, to hear, on the authority of Mr. Bowker (whatever that may be worth) that the master-spirit of the alliance of capitalists who are behind the public services of New York already named—gas, electricity, and street railways—is Mr. William C. Whitney, who is no longer, as reported from another quarter, heavily interested in the coke-oven gas plant of the New England Gas and Coke Company. Mr. Whitney holds no official position and has no stated responsibility in this combination; but somehow what he wishes is attended to first, and under his fostering care the concern has grown to its present gigantic proportions. But, it may be reasonably asked, how came a gas company to be mixed up with street railways? That is a long story, but not so strange as it appears at first sight, when it is considered that electricity is the flux. The first necessary step towards the larger consolidation was the unification of the solvent New York Gas Companies which survived the "rate war" of 1899-1900. The Consolidated Gas Company came out on the top; but with a new ally of a sort in the person of Mr. Anthony N. Brady, who had been a rival force, and in particular was already great in the electric lighting interest and in electric tramways. The transactions that now went on with the object of securing for Mr. Brady and his associates the supreme control of the Edison and other local electric lighting interests make instructive reading. These were countered by the Consolidated Gas Company, who had the Standard Oil interest and the National City Bank at their back. Various heavy commitments were made on all sides, until the inevitable collapse came; and all manner of New York securities shrank $100,000,000 in value in one day. The Brady-Whitney combination suffered heavily, and again the Consolidated Company contrived to ride out the storm.

When all the noise had subsided, it transpired that the Company would add Mr. Whitney, Mr. Brady, and an associate of theirs to the Board, and would take on the Power Company, which meant all the electric lighting and traction interests, at the par value of the capital stock. At the ensuing general meeting, the proceedings were overruled from the chair in this sense, and the capital of the Consolidated Company was raised at a stroke by enough to cover the $36,000,000 of the absorbed stock. The minority are treated as having no rights at all in these dealings, except to their dividends, which the majority can be expected to recognize. No information is published, and individual shareholders are refused all requests for figures or intelligence as to the actions of the directors. Individuals are called upon to exchange their holdings for stock bearing another name, watered to the taste of the majority. There is no redress. If a recalcitrant minority continue to hold out, they do so at the risk of finding that the property has ceased to be quoted by name on the New York Stock Exchange, and has therefore become unsaleable. It does not pay individuals to take legal proceedings in defence of their rights. The result is the Consolidated Gas Company, with a capital stock of $72,814,000, with about an equal sum in bonds. Allowing 210 as a recent average price for the stock, and par for the bonds, the market value of the gas and electric securities in New York thus stands at about $222,000,000; not including the borough of

Brooklyn. The street railways make up the rest to the figures stated, $400,000,000, of which barely one-fourth part is physical property.

The consideration that evidently paralyzes such critics of the consolidated enterprises as Mr. Bowker is that the service rendered to the public by what he, as a professed Municipalist, evidently wishes to class as a pernicious combination, is both cheap and satisfactory to the public. The present Metropolitan Street Railway, he admits, offers an excellent service of cars, as rapid as the nature of the road permits, well lighted, well heated, and comfortable, with an almost universal transfer system for a 5 cent fare. In face of the accomplished fact, the people do not care for the "might-have-beens" of municipal enthusiasts—especially with the Civic Government of New York before their eyes. It is the same with the gas supply. The New York Legislature enacted that "dollar gas" should be sold in the city as from 1901. It is being sold accordingly; and nobody seriously complains. It is the same with the electric light. To come back to our original position, all these good things, as a workman would say, "take some doing;" and that fact is the central one of the situation in which the American gas engineering profession finds its members to-day.

ELECTRIC LIGHTING MEMORANDA.

A Check to the London County Council—Electricity-in-Bulk Generation and Distribution—Electric Light Holds its Own in Paddington for Six Months Longer.

THE o'er-vaulting ambition of the London County Council to become the electricity-in-bulk supplying authority for the Metropolitan area has achieved a fall. The Bill for vesting this power in the Council has been thrown out by the Committee. The project strikes an independent observer as remarkably bold—not to say impudent—even for this most hare-brained of popular governing bodies. The scheme was dead against the principle upon which these electricity-in-bulk undertakings are founded, which is expressed in the finding of Lord Cross's Committee, that the purchase provisions of the Electric Lighting Act, 1888, should not apply to them except in very special cases. The reason for this rule is obvious. It is of the essence of electricity-in-bulk generation, as a separate undertaking, that it surpasses the parochial limits which alone are regarded in the Electric Lighting Acts. There could be no permitting a small local authority whose district is covered (among others) by a venture of this kind, to enjoy and exercise a right of purchasing so much of the undertaking as it might pretend to have an interest in. That would be cutting up the animal alive. In the specific case of Westminster, it was pointed out that the city is partly supplied from a generating station situated far away upon the bank of the Regent's Canal. Westminster itself can never purchase this station; but the Bill would enable the London County Council to do so, at any time, without asking the consent of the Corporation of Westminster. Another sweet provision of the defunct measure was that under it the London County Council might pick and choose between the undertakings—buying up the weakest, and competing with the others until they were exsanguinated to its taste. And yet there are those who pretend that the powers of Parliament for the further regulation of statutory undertakings might safely be transferred to the County Councils! There is one strong argument against this idea of devolution; and its name is the London County Council.

At the same time, these electricity-in-bulk generation companies require good looking-after. They have already, in one particular instance—that of the North Metropolitan Electric Power Supply Company—found it desirable to add the ordinary business of electricity distribution to their original plan of operations. This development is a perfectly natural, and indeed in certain circumstances an inevitable one. Where there is a district, lying within the area of the company, which has no authority already empowered to supply electricity, or where the local authority or company refuses to carry out an Order, why should not the generating company also become the distributor in this fallow region? More, there is an actual economic advantage to the consumer in having a supply direct from a big concern, instead of being compelled to put up with a costly and usually inferior service of a small local establishment. The North Metropolitan Electric Power Supply Company is a large undertaking, with a capital of £1,000,000 sterling. All the small local authorities wanted to keep it out; but the Committee did not agree that they knew what was best for themselves. The Committee would not go the length of refusing to confirm the Provisional Orders of the authorities, which came before them in competition with the Company's Bill; but they thought it a great mistake for the authorities to commit themselves to the multiplication of small generating stations when they could have a supply in bulk at their doors. Consequently it was left to the Company and the authorities to hitch their horses together as best they could.

Our good contemporary, the "Electrician," has not quite recovered from its recent shocking discovery in regard to the relative costs to the consumer of incandescent gas and incandescent electric lighting. It has braced itself up to admit that "gas engineers are to be congratulated on the recent progress that has been made with incandescent gas-lamps for street lighting," and graciously allows that "their efforts should be greatly appreciated by those towns which have not yet got electric light within their reach." This is generous; but it is generally found that the towns which appreciate incandescent gas street lighting are precisely those who know most about the other means of lighting—as Manchester, for instance. But our contemporary rejoices to learn that "electric light can hold its own against the most improved Welsbach burner for this purpose," on the supreme authority of—a "discussion at the Paddington Borough Council," carefully reported with this object. This irrefragable proof turns out to be a statement of the Chairman of the Gas and Electricity Committee that if the lighting of a certain thoroughfare, which at present has 14 arc lamps costing £30 a year apiece, were altered to incandescent gas at an estimated annual charge of £169, he did not think the street would be so brilliantly lighted. The Surveyor, however, was of opinion that it would be sufficiently lighted by gas. In the event, the Council decided to leave this particular street alone for the time being, while they turned their attention to the improvement of the public lighting throughout the borough by converting the street-lamps to the incandescent system. Accordingly, the question of the one street was postponed for six months. And this is regarded as a proof that electric light can hold its own against the most improved Welsbach burner! The "Electrician" is evidently fain to be content with small mercies.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1368.)

BUSINESS on the Stock Exchange last week was only very moderate, a position which several factors combined to produce. First, there was the fortnightly settlement which engaged most attention; and, when this was through, the approach of the Whitsuntide holidays acted as a deterrent from embarking in fresh business. But what was uppermost in all minds was the Peace Conference; and, as the appointed day came nearer, there were signs of a disposition to be rather less sanguine of an auspicious result. The uncertainty intensified, until towards the close most people declined to operate, and resolved to await some sign as to which way the cat was going to jump. So prices, which had been pretty firm, have not undergone much fluctuation. There was a good demand in the Money Market for the purposes of the Stock Exchange settlement and other requirements, and discount rates were firm. In the Gas Market, business showed a fair improvement in point of activity when compared with the sluggishness of last week; and some of the more important issues which had been lying dormant for some time came into action again. The tendency was much more favourable; and though variations in quotation are neither numerous nor considerable in degree, they are almost without exception in the upward direction. In Gaslight issues, the ordinary started very quiet, but soon brightened up and became pretty brisk. The opening price was 93½; and it eased away gradually, until on Thursday 92½ was touched. Then it suddenly rose to 94, and the quotation advanced a point. The secured issues were moderately dealt in, and the maximum and preference were rather shaky; but the debenture was firm enough. South Metropolitan was not much dealt in. It began with an advance of a point; but the price became weaker later on, and a drop back again came quite within the bounds of possibility. Commercials were almost unnoticed, and were unchanged. Business in the Suburban and Provincial group was very slack, but changes were favourable—Brighton ordinary and West Ham advancing. Among the Continental Companies, Imperial was the only one to attract attention; and there were several dealings in it *ex div.*, but prices were not particularly good. None of the undertakings located in the remoter world offered anything to call for notice. The Water Companies were little dealt in, and passively awaited their fate at the hands of the Parliamentary Committee; but the few changes which took place were favourable to East London and to New River debenture.

The daily operations showed very little variation in prices, and the changes of quotation were as follows: On Monday, South Metropolitan and Brighton ordinary rose 1 each. No changes occurred on Tuesday. On Wednesday, the changes were limited to a fall of ½ in Gaslight preference. On Thursday, Gaslight ordinary rose 1, and West Ham new ½. In Water, East London rose 2, and New River debenture 1.

The Birmingham Engineership.—In the report of the Gas Committee of the Birmingham Corporation to be presented at the meeting of the Council next Tuesday, reference is made to the retirement, in October, of Mr. Charles Hunt from the position of Engineer in charge of the Windsor Street and Adderley Street stations. A reorganization of the engineering staff will then be necessary; and the Committee propose that Mr. Henry Hack, the Engineer of the Saltley station, shall be appointed Engineer-in-Chief, at a salary of £1600 per annum, with an experienced Works Engineer to take charge of one of the stations, and to be available, in the absence of the Chief, to give both advice and assistance.

AT THE WOLVERHAMPTON EXHIBITION.

WOLVERHAMPTON is not by any means a stranger to art and industrial exhibitions. This is the third which the enterprise of the town has brought into existence; but neither of the predecessors was on anything like the scale of the present one. Yet, size notwithstanding, we are afraid that "successful" will not be the judgment pronounced upon it long before its closing next November. What the summer will do in the way of taking excursionists to the town cannot at present be said; but already there are doubts being expressed on many sides as to the future. The size of the exhibition may be considered large for the good folk of Wolverhampton; but it is not so to anyone who was at the Paris Exhibition of 1900, and then at the Glasgow Exhibition of 1901. From Paris to Wolverhampton, the shows have descended in scale; and what we feel after spending some three or four hours at the new exhibition is that, just as the Glasgow exhibition was but a slice out of the great Paris concentration of the goods of the world, so Wolverhampton is but the ghost of Glasgow. Its situation lacks the splendid setting which the site of the Glasgow display possessed and lent to the making of the attractions of the exhibition. There are only three respectable sized stucco-covered buildings (as compared with the many at Glasgow) devoted to the exhibits; and when the visitor has exhausted these, he has nothing more upon which to feast his eyes, or to arrest his interest. There is nothing in fact left for him to do but to take a voyage through fairyland, or, if he longs for a little more exhilarating change, he can take a trip on the water or spiral chutes.

Of course, it must be conceded that a large number of the visitors to the show will not have had the advantage of seeing the two great exhibitions of Paris and Glasgow, and will only be able to make their comparisons from their acquaintance of the local and more limited endeavours of preceding years; but it is not those in the immediate neighbourhood of the exhibition upon whom such a venture can depend, for a length of time, for its success both from the promoters' and exhibitors' points of view. And to attract from beyond the bounds of the town in which an exhibition is planted, it must possess some great magnetic influences. These we fail to find at Wolverhampton. One walks through the industrial hall, through the machinery hall, and through a building devoted to Canada, in search of something new, or something really attractive, and finally one has to give up the quest dispirited.

The industry which the "JOURNAL" represents has little part in the show. Outside is the best feature of all in the demonstration which the Welsbach Company have made in the lighting of the grounds with their self-intensifying gas-lamps. The white stucco-faced buildings show up well under the benign influence of these lamps. They are well placed, and, being at a good height from the ground, the whole place seems bathed in a flood of beautifully rich and mellow light. There are 73 of these self-intensifying gas-lamps, and each is fitted with three-light clusters of 800 to 900 candle power. The disposition of the lamps for the lighting of the main entrance is particularly well done; and the Public Lighting Department of the Welsbach Company ought to be complimented on the judicious arrangement they have made. At the door of the Industrial Hall which first comes into view on reaching the entrance gates are two posts each carrying three of the lanterns; and they make together a strikingly powerful and brilliant display—heading well the very effective illumination by the single lamps through the grounds. When one emerges from this demonstration of what gas can do in the way of illumination into the dimly lit neighbouring streets, which is done by means of small flat flames enclosed in the shabbiest of shabby lanterns, one keenly realizes the very great development that has been made in gas illumination. If after this display of the rich merits of high-power incandescent gas lighting, the Wolverhampton Corporation do not voluntarily set about freeing their streets from the present reign of gloom, then we hope the ratepayers will take sharp measures to bring them to their senses. There is a little electric lighting in the grounds; but, as at Glasgow so at Wolverhampton, we are puzzled to know why the electric lighting people submit themselves to a detrimental comparison by placing arc electric lamps in close proximity to high-power incandescent gas-lamps. Inside the buildings, during the hours of the greatest attendance of the public in the evening, gas is nowhere in regard to the volume of lighting—arc lamps having been adopted for general illumination, and most of the exhibitors, excepting the gas-stove firms, have adopted incandescent electric lights for the illumination of their stands. But the gas-stove companies have stood true to their colours; and we find the Lucas intensive incandescent gas-lamps making a brilliant show at the stand of Messrs. Parkinson and W. & B. Cowan, Limited, and Coombes' incandescent lamps doing splendid duty at the stands of the Richmond Gas Stove and Meter Company, Limited, the Cannon Iron Foundries, Limited, and the Carron Company. The latter lamps are also installed throughout the Industrial and Machinery Halls and the boiler-house; but they are not, we believe, brought into service until the electric lighting plant is closed down at 10 p.m. The Coombes lamp, it may be mentioned, is constructed entirely of copper, and every part is riveted instead of soldered. The inventor claims that, in designing this lamp, he has taken an entirely new course. He has so made the lamp that an abundant supply of cold air can be admitted; and this, it is said, materially increases the life of both the mantles and the globes. Whether or not this is so, the lamp certainly gives a splendid light; and, we are informed, that the general management of the exhibition are loud in their praise of the effect. The interior gas lighting was carried out by Mr. Coombes, under the supervision of Mr. P. G. Winstanley, the Engineer of the Wolverhampton Gas Company.

Of the exhibits of the gas stove and meter firms, there is little that is new to be said; and therefore a glance over their stands is all that is needed here. Taking them in the order in which the stands are numbered, we have first to notice the stoves of the Cannon Iron Foundries, Limited, of Deepfields. They have on view their latest productions in the way of gas-fires, many of which are coated with their speciality "Vitro Lustre," which is claimed to be a permanent imperishable enamel, and is produced in various colours. There are also a series of their gas-cookers on view with the "Porceliron" interiors, and grillers with the double burners, so that they can be heated from the top or the bottom just as is most convenient for the purpose required. The non-lighting back burners of the firm are shown; and among the miscellaneous articles attention is called to gas smoothing irons, with an interior grid-top for distributing the heat, and a patent valve for closing, after the iron has been prepared for use, in order to retain the heat.

The Richmond Gas Stove and Meter Company have a long side stand, and make a very effective show, with their heating-stoves in bronze, copper, brass, silver, and black finishes. Among them are noted the "Triumph," the "King Edward," the "Waverley," the condensing "Dragon," and others, the features of all of which have received mention in the "JOURNAL" from time to time. There is also a big display of the "Model" series of gas-cookers; and, among other types of goods, there is a bar water-heater, which bears a good repute as being able to fulfil that useful function and at the same time warm the bar in which it is used. The "Alpha" steam-cooker for use with small gas-stoves is a new article that has been taken up by the firm. Grillers, carving-tables, hot closets, and many other things complete the representation of the Company's gas-stove department. Several specimens of their meter work are shown; and a nice testimony to Messrs. George Glover and Co.'s productions is seen in a 5 cubic feet test-holder, which looks nearly as new to-day as it must have done when entering on the 35 years' service that it has seen.

Very close in the same group of exhibitors, we find Messrs. Parkinson and W. & B. Cowan; and they have brought together a very good specimen collection of their productions of a kind likely to interest the general public. There are gas-fires and cookers of different sizes and finishes, wet and dry meters (both ordinary and prepayment), a Bradbear's gas regulator, and an improved lamp fitted with Simmance and Abady's patent lighting-cock for incandescent burners. The "Jewell" nickel-plated fire is one which particularly catches the eye; and a few minutes' examination of the cookers on view reveals that the firm have been introducing into them various little improvements, which greatly enhance their convenience. The hot-plate, we notice, is hinged to facilitate the removal of burners, &c., for cleaning; and the top bars, though easily removed, remain in position when the top is thrown back. There is also a double reversing grill burner, which can be used for boiling or grilling separately, or for both together. The ovens are also fitted with a patent sliding bar, to which is suspended the meat-hook; and this dispenses with the necessity for placing the hands in the hot oven. The grid-shelves are also self-locking, which obviates accidents by preventing the shelf being drawn out too far. Even when fully extended, the shelf remains in a horizontal position, and is quite rigid. To remove the shelves for cleaning, they have simply to be lifted upwards. Then to the pan grid is fixed a patent graduated grill, to enable the distance from the deflector to the food to be regulated to a nicety by means of a simple and ingenious movement.

The Carron Company are also exhibiting examples of their numerous manufactures, including gas cookers, fires, and cheap grillers. Attention is specially directed to the series of cookers bearing the Company's name. There are not a great number on view; but such as there are evidence the fact that the Company have been giving close study to this class of their productions. Fitted with the loose extension bracket shelf for the front of the crown plate, the cookers have a very attractive appearance, and look capable of giving every satisfaction by long life and good work. The "Juno" cookers have also several useful features, as have also the "Vulcan" grillers. These are supplied with powerful burners, and double deflecting-plates for throwing down the heat; and they are supplied, if required, with a door in front to convert the space below into an oven. A particularly noticeable feature on this Company's stand is a very fine roasting oven, with porcelain enamelled linings.

We have to get to the Machinery Hall before anything more is found which has any special interest for the gas engineer. In this department electrical machinery is the dominating feature. Messrs. Crossley Bros., Limited, and the National Gas-Engine Company have on view various types of their gas-engines in motion. Tangyes, Limited, are likewise exhibiting in this class.

Of course, mixed up with the goods in both sections—particularly the machinery—are discovered many exhibits which will have interest for engineers of all branches of the profession. There are for example the exhibits of the Anglo-American Oil Company;

Ewart's geysers at the stand of Mr. J. H. Butler, a local exhibitor; the gas and water tubes of Lloyd and Lloyd, Limited, and the New Brotherton Tube Company, Limited; the fire-brick work of Messrs. E. J. & J. Pearson, Limited, and the Farnley Iron Company; the screwing and tapping machinery of Mr. Samuel Platt; the models of the Stirling Boiler Company; the various productions of Messrs. Wallach Bros.; the water-meters and gas governors of Messrs. J. Stott and Co.; and the pneumatic tools of the International Pneumatic Tool Company, Limited. In the electrical line, gas engineers will be interested in inspecting the splendid apparatus turned out in the shops of Messrs. D. Bruce Peebles and Co. Acetylene gas lighting, unlike other recent exhibitions, has only one representative in the Birmingham firm of Lockerbie and Wilkinson.

This exhausts all that is to be seen of special interest to the gas industry. At the same time, we have not shown that the exhibition has limited attraction for gas engineers in order to deter them from paying it a visit. The lighting of the grounds alone should be sufficient inducement for anyone within easy railway journey of Wolverhampton.

FROM OLD CONDITIONS TO NEW AT THE WALSALL GAS-WORKS.

Gas-works have, by the inexorable laws of time, to meet the end of all forms of mundane life and other creations of man. From the day on which a piece of gas plant enters upon its career of work and usefulness, the process of destruction begins; and some day it must perish. We stand before a new gasholder, before a new bench of retorts, or before any other piece of new gas apparatus, and admire its freshness and strength, and the several new ideas which have been incorporated into its frame and body in order to increase its serviceability and capability in comparison with similar plant that has gone before. Its boldness at the time almost impresses one with everlasting life; but the time will inevitably arrive when that which is the admiration and the hope of the one day will, either from its wasted energy, decay, or its supersession by something of greater power, simply cumber the ground on which it stands, and be a hindrance to progress. Economy and prudence, or the greater necessities of the time, will then demand its removal; and its place will thenceforth be taken by that which experience with the old and the changes wrought by time have produced and made superior.

Wandering through the Pleck Works of the Walsall Corporation to-day, we see all these conditions exemplified. There is old and almost worn-out plant standing; and there is the new which looks as though it will stand all the ravages of work and time. But that, too, will some day come to the end of its useful life. Two or three years ago, much of the plant on the manufacturing side of the works had arrived at a stage when it was no longer equal to requirements, nor was capable of the work of its bygone days; and large renewals and the adaptation of the economical expedients of invention were an absolute necessity—both for economical reasons and the exigent demands of the district. About the same time, the burden of years and infirmity, much to the regret of his professional brethren, had convinced the then Engineer and Manager (Mr. John Tindall) that he was physically unequal to the task of carrying out the large scheme of improvement which the passage of time had rendered imperative. He therefore retired; and his place was taken by Mr. B. W. Smith, whose excellent work at Smethwick is so well known to our readers. The large extent of the required renovation and addition with which he was confronted at Walsall was something much to his liking, and it gave a good range to his energetic spirit, which, we find, has not by any means been suppressed by the execution of the most troublesome part of the task with which he had to grapple. It was only about two years ago that Mr. Smith was appointed to the charge of the works—to be exact, it was on May 9, 1900. On June 18, he entered upon his duties; and between then and the following spring was a time of great preparation for the changes which were to be effected from one end of the works to the other. Plans were laid, drawings and specifications made and drafted, contracts were entered into, and contractors here and there in different parts of the country were set in motion; and by the spring of last year—when the anxiety of the winter work had passed, and within twelve months of the day when Mr. Smith had taken up his new duties—the old Pleck Works was the scene of great activity, and the actual work of reformation had commenced. By the autumn of the year, the more important part of the scheme had been completed, and was ready for the heavy work of the winter which has just ended. But what has been accomplished may be likened to the longest chapter in a tale; odd work is even now going on, which will form the second chapter; and the Engineer has his eye on the material which will supply the third.

Having passed through the works and seen what exists of the old order of things, it is not difficult for one to picture the conditions which time and growth of business had brought about, and which conditions Mr. Smith had to face. There were the buildings—in too good a state to be discarded, although not exactly of the design that an engineer would to-day put up if called upon to reconstruct them or project new ones; there were the contents of those buildings no longer fitted for economical production nor adequate for dealing with the increased and increasing duty imposed upon, and required of, them; and, with the growth of gas consumption, parts of the apparatus had become altogether out of balance with other parts. With so much to be done, a careful regard had to be paid to the expenditure of capital; the site, too, and the then existing disposition of the plant would not permit of any extensive re-arrangement; and time also was a factor which had to be studied. There was the position then that the Engineer had before him, and upon which he had to work. He approached his task (we say this and all that is written in these opening paragraphs without asking his permission) in no half-hearted manner. The proofs of this are found in the new conditions which exist to-day, and which were established in such a few months after their conception. But the saying of this brings another point to mind, and it is that, however much Mr. Smith projected and plotted out a considerable expenditure of capital, he was absolutely tied from further movement without the sanction of his Committee and the seal of the Corporation. The fact that the first scheme has been accomplished is again evidence of two things—that the Gas Committee and Corporation were convinced of the necessity of large conversions being made, and that they had full trust in their Engineer. Upon this, they may be complimented.

But turning now from essential explanatory introduction to the newly-established works. The present maximum output, it should be stated, is 2½ million cubic feet of gas per day; and Mr. Smith's plans contemplate the ultimate raising of the works throughout to a capacity of 4 million cubic feet. He has already taken a big step to that end. It is easy to divide the scheme so far completed into four sections; and in the order given here we propose to deal with them in two or three articles—

First, No. 1 retort-house has been entirely dismantled, and the settings reconstructed; compressed air charging and drawing machinery has been installed, with the necessary plant for dealing with the coal; and a coke-handling plant, with De Brouwer conveyor, has also been laid down.

Secondly, the whole of the purifiers in No. 1 house have been taken out; new ones constructed; a stage-floor revivifying-house built between Nos. 1 and 2 purifier-houses; and a complete elevating, conveying, and distributing plant for dealing with the oxide has been installed.

Thirdly, new additions and alterations to other parts of the works apparatus have been made.

Fourthly, a complete range of new shops has been erected and equipped.

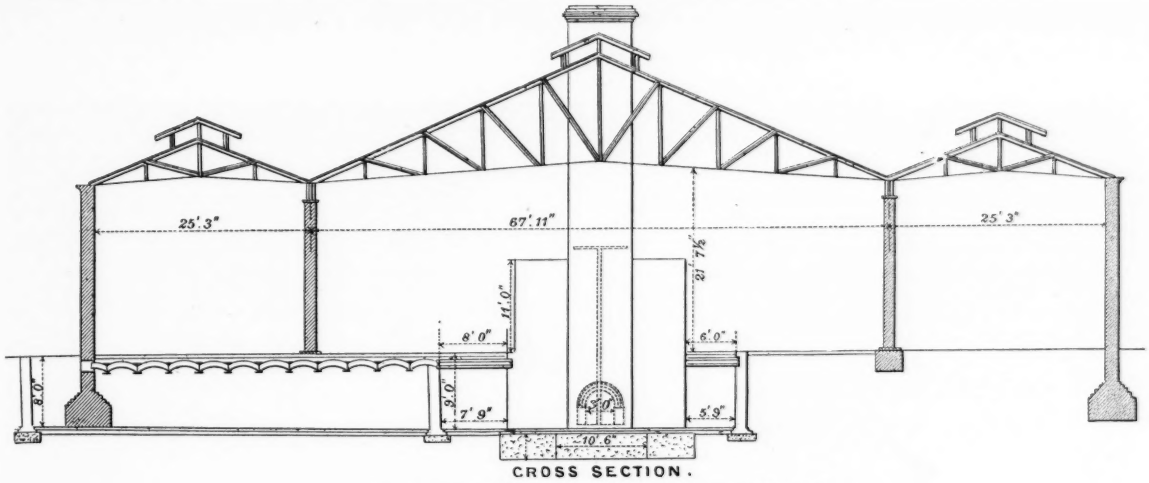
The New Carbonizing Plant.

Following the sectional division which we have adopted here, we shall confine ourselves this week to the new carbonizing and coal and coke plant. But it must be borne in mind that the circumstances of the retort-house and its situation imposed certain limitations on Mr. Smith in the making of his plans.

There are two retort-houses on the works; but the present scheme deals exclusively with No. 1 house. The building occupies a large superficial area; but it is rather low-pitched. Its internal measurement is 180 ft. 7 in. long by (including the coal-stores flanking both sides) 118 ft. 5 in. wide. The retort-house proper has a span of 67 ft. 11 in.; and the coal-stores each a width of 25 ft. 3 in. The two old benches each consisted of eight arches of seven retorts of various sizes of ovals and rounds; and these had to be taken down a bench at a time, in order to comply with the requirements of manufacture. A prominent feature of the old house was a chimney 150 feet in height; and it has its counterpart in one still standing in No. 2 house. However, it was part of the scheme that the chimney in No. 1 house should go the way of the settings. In view, however, of the proximity of so much plant and building, its demolition was rather an anxious piece of work; but by the precautions taken, and its displacement being effected internally, the work was accomplished without accident of any kind. The old settings and the chimney having been removed, excavations were made of sufficient width and depth to ensure a solid foundation for the new benches, chimneys, and subways.

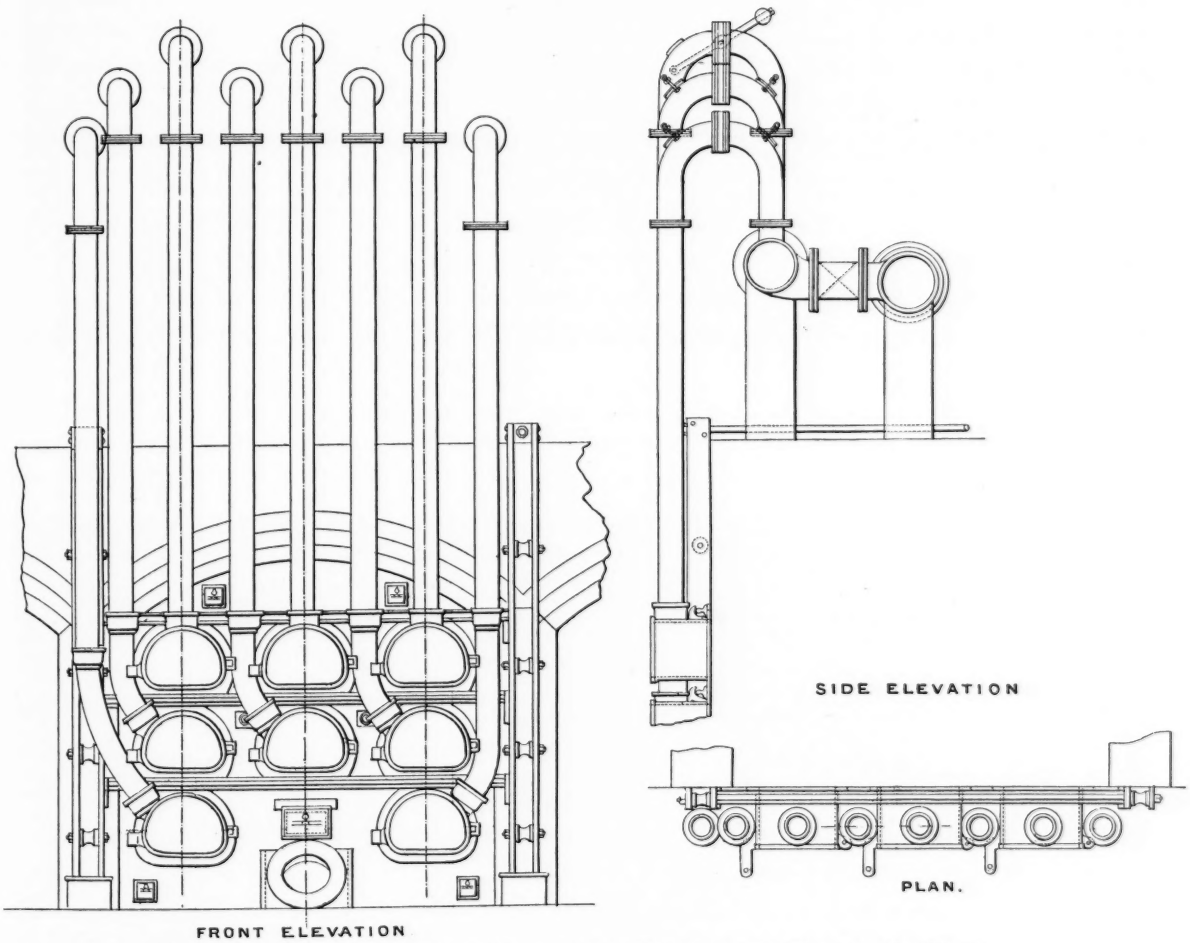
Before giving details as to the construction of the new benches, it may be stated that the old settings were only capable of producing about 1 million cubic feet of gas per day; but Mr. Smith has on the same ground succeeded in constructing settings equal to an output of about 2 million cubic feet. In all, there are now fourteen beds of eight horizontal retorts Ω shaped, 20 feet long by 22¼ in. by 16¼ in. Remembering Mr. Smith's success with his inclined installation at Smethwick, it may be wondered why he did not adopt the system here. In the first place, the house without an extensive addition to its height, would not have accommodated inclines; in the second place, the period within which the work had to be accomplished was not a negligible factor. So, notwithstanding Mr. Smith's fancy for inclines under favourable conditions, here horizontals, with charging and drawing machinery, gained preference.

With this explanation, the construction of the benches may be described in greater detail. The total length of each bench is 78 ft. long by 20 ft. wide and 11 ft. high from the floor-level. The end piers are 3 ft. thick, and consist of 2 ft. 3 in. of common brick-work and a 9-inch fire-brick lining. The middle piers are 9 feet apart and 18 inches thick, and are constructed entirely of fire-brick. From the piers the arches are turned at a 6 ft. 6 in. radius, with two 4½-inch rings of arch fire-bricks, and a 4½-inch ring of common bricks. In the levelling up and top work, hard brown bricks were used. The main flue running the length of the



CROSS SECTION.

No. 1 Retort-House at Walsall Gas-Works.



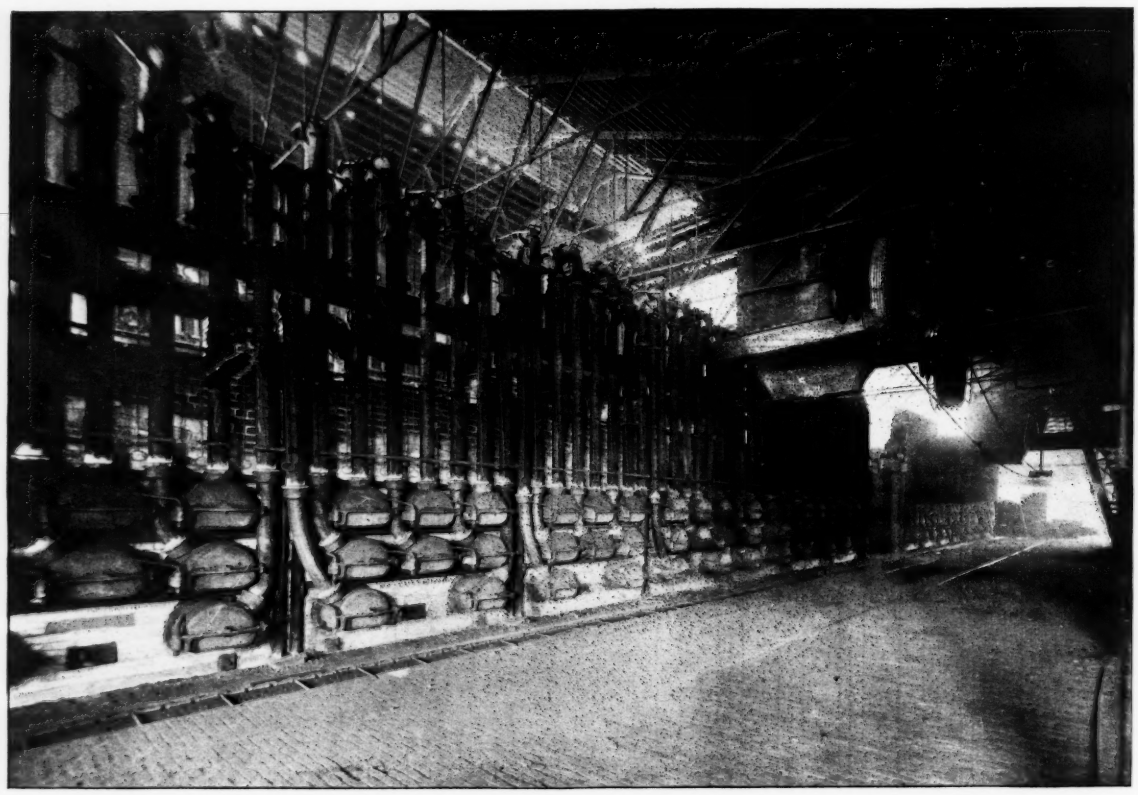
The Reconstructed Settings in No. 1 Retort-House at the Walsall Gas-Works.

benches is also of fire-brick; and its inside dimensions are 3 ft. wide by 3 ft. 6 in. high. It is built with 14-inch walls and arch-bricks; and is connected to the chimneys with a 4½-inch midwall in centre. For the flues of the settings, there are openings 12⅜ in. by 9 inches wide, two on each side of the beds, and one to each bed. The two chimneys are erected centrally to and between the benches; and they are 50 ft. high by 4 ft. 6 in. by 1 ft. 6 in., inside dimensions. They are built separate from the brickwork of the benches. To 13 ft. 6 in. from the floor-level, they are built of fire-brick; and to that height, the mid-wall is carried. From there, the chimneys are of 18-inch hard brown Staffordshire bricks. The regenerator furnaces are of Mr. Smith's own arrangement. On the firing side, the subway is 8 feet wide, and on the opposite side 6 feet; and these are connected by central and end cross subways.

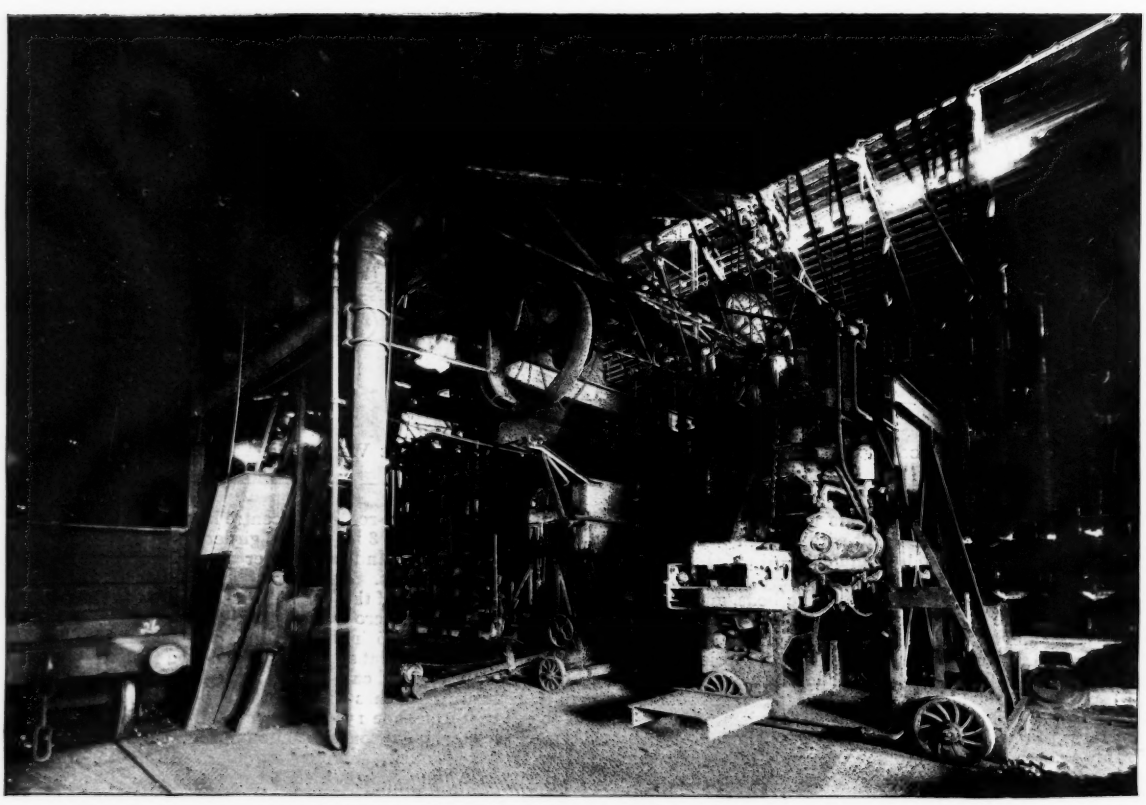
Coming to the bracing of the benches. At their outside ends are seven buckstays, and at the inner ends six. These consist of steel rolled joists, 14 in. by 6 in. by 22 ft. 6 in. long; and they are secured together longitudinally by clips and tie-rods, 2 inches in diameter. The tie-rod of the centre buckstave is fastened at the chimney end to an 8 in. by 5 in. girder, 9 ft. long, coming in front of the chimney; and this girder is again secured to the two nearest buckstaves. An 8-inch by 5-inch girder, 9 feet long, is fixed at the back of the chimney, and secured to the two nearest buckstaves. The cross buckstays for both sides of the setting are fixed at 10 ft. 6 in. centres, and are 22 feet long. They are built up with two flat steel bars 6 inch by 2 inch, and are coupled together by 5-inch cast-iron roller distance pieces. The cross tie-rods are 1¾ inches diameter. Each of the latter buckstaves has a cast-iron shoe 15 inches deep, with beading at top, to protect the steel bars from the action of the water on the floors both in the cellar and on the charging-floor. Across the front of each furnace in the cellar is a stay, consisting of a rolled joist 6 inch by 5 inch, fixed to cast-iron bracket blocks fastened to the buckstaves. The whole of the iron fittings and pipes required in and about the benches are new. While speaking of this part of the work, there is another matter which, being a point of interest to

THE RECONSTRUCTED RETORT-HOUSE PLANT AT THE WALSALL GAS-WORKS.

[See page 1344.]



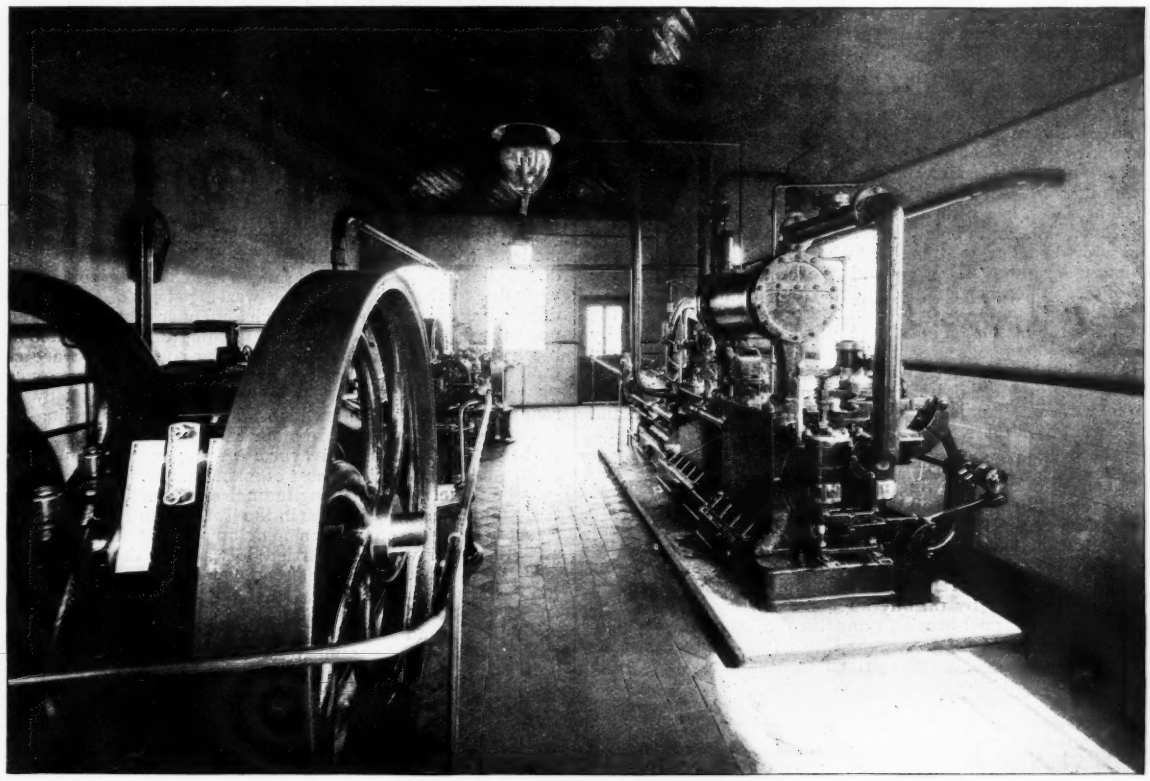
VIEW OF NON-FIRING SIDE OF RETORT-BENCHES (RECONSTRUCTED FROM OPEN FIRES), SHOWING CHARGING-MACHINES IN THE DISTANCE, AND THE DE BROUWER COKE-CONVEYOR.



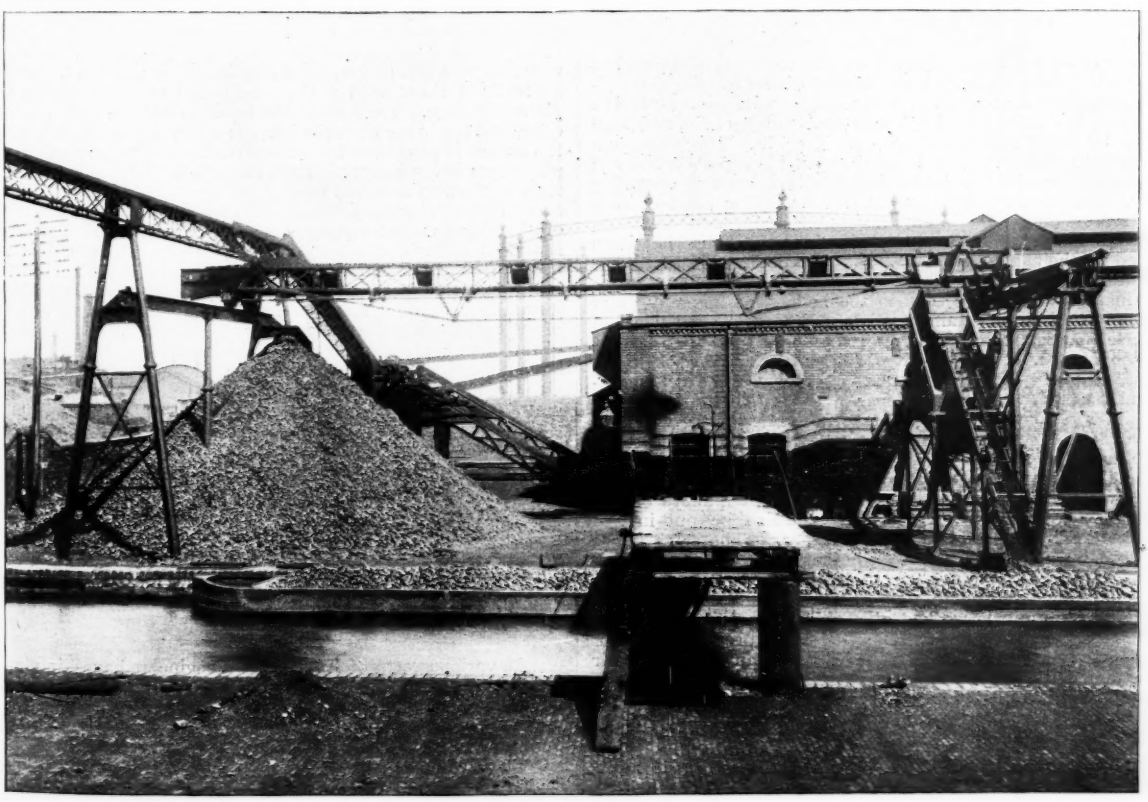
RETORT-BENCHES, VIEW OF FIRING SIDE, WITH DRAWING AND CHARGING MACHINES.

THE ENGINES FOR THE NEW COAL PLANT AND THE DE BROUWER COKE-CONVEYOR AT THE WALSALL GAS-WORKS.

[See page 1344.]



Engine-House, showing Gas-Engines for Coal Plant and Steam-Engine for Compressing Air for the Charging Machinery.



General View of Exterior Coke-Handling Plant (De Brouwer System), showing Sloping, Cross, and Travelling Conveyors.

The barge-loading shoot is seen on the right-hand side of the picture. Under the conditions previously existing, the platform crossing the canal was used for this work; and it was kept in position for the purpose of this photograph.

many, may be referred to. As is well known, Mr. Smith (like Mr. R. O. Paterson, of Cheltenham) is a strong advocate of dry mains. He was the first, we believe, to introduce them for inclined settings in his installation at Smethwick; and they are still working there. He has carried his conviction that dry mains are the correct things into practice in these new horizontal settings at Walsall; and, during a visit the other day, he showed, with some little pride, that without hydraulics he had a perfectly level gauge. While watching the gauge, which did not evince the slightest indication of varying its equilibrium, he mentioned that a few weeks previously, the unique experience could have been had of seeing, on the one side of the gauge case, a gauge showing, with hydraulics, a vacuum of 2 to 2½ inches, and, on the other side, a perfectly level gauge without hydraulics. There is no chance of Mr. Smith altering his views as to which is the more preferable system under present circumstances.

This, however, is a little digression from the main purpose of this article. Without going into the minutiæ of the construction of the retort-benches, we think that what has already been stated sufficiently describes their general features. Of course, the work of conversion has entailed a considerable amount of heavy alteration—such as the floor work above, and the paving in the cellars, and the making good all the disturbances occasioned by the changes. The house, too, was previously badly lighted and ventilated; and it is seen that new and ample provision has been made by the Engineer in both these respects. The contract for the brickwork was carried out by Mr. T. Vale, of Stourport, and the ironwork by Messrs. Butt and Co., of Gloucester.

The Coal-Feeding Arrangements.

The charging and drawing machinery and the coal-feeding plant were supplied and fixed by West's Gas Improvement Company, of Manchester. The machines are of the compressed-air type; and, when we say this, no further description is necessary for "Journal" readers. The chargers are capable of delivering 4 cwt. of coal into the retorts. The supply of coal is brought direct into the house by railway-waggons. On one side of the house, there is a cannel-breaker; and on the other side, a coal-breaker—each of them being supplied with two sets of cast-steel claws, fitted to steel shafts, and driven by cast-steel gear. Both are capable of dealing with 20 tons of coal an hour. Over each breaker is a steel-plate hopper, of a capacity of from 6 to 8 tons. At the foot of each of these, there is a simple system of slide-doors for regulating the size of the opening to the breakers, or, if the coal is of a size which does not require crushing, for bye-passing it direct to the coal-elevators, without sending it through the breakers. These slide doors are regulated by gearing leading to a hand-wheel placed above the floor in a convenient position for the attendant.

The coal-elevators are constructed of steel plates, braced latticed steel framing, and guides for the buckets. The buckets are 12 inches wide, and spaced 18-inch centres on to a Ley's detachable link chain. Each of the elevators is capable of raising 20 tons of coal per hour. They deliver on to two of West's roller push-plate conveyors (with latticed steel girder framing) extending across the retort-stack. As in the case of the elevators, the conveyors are fitted with Ley's detachable link chain, and supported by large rollers running on Z paths. The conveyors deliver into four overhead hoppers, each having a capacity of 10 tons, and provided with two outlets with doors and operating levers. Provision is made so that all the working parts of both the elevators and conveyors are accessible for inspection.

An old blacksmith's shop at the end of the house has been utilized for the engines connected with this plant. Mr. Smith has a preference for the engines being situated above the ground-floor in this way, rather than in the cellars, as in many other places. The house contains a pair of "National" gas-engines of 43-horse power for the working of the coal breakers, elevators, and conveyors; the only reason for having two engines being to obviate stoppage in the event of a breakdown. On each underground shaft there is a fast and loose pulley, with belt-fork gear, so that either gas-engine can drive the shaft as required. On the end of each of these shafts is a belt-pulley for the belting leading down to the main shafting running along the outside wall of each subway. At the end of this shafting, there is a belt-pulley with belt leading to the fast and loose pulleys on the breaker driving-shafts. These belts can also be put in and out of action by means of belt and fork gear. The same house also contains a 35-horse power steam-engine for the compressor supplying the air for working the charging and drawing machinery. The compressor is of the West and Jenkins patent single-line two-stage type, and is worked at a steam pressure of not less than 60 lbs. per square inch. It is fitted with a pressure-governor for reducing the speed of the engine when the air in the receiver has attained its working pressure. It was interesting to hear from Mr. Smith that on August 1 last this engine-house was a blacksmith's shop, and that by Oct. 17 the machinery was at work. This was a smart performance. The whole of the work is carried out in the creditable style for which the contracting firm is famed.

The Coke-Handling Plant.

The whole contract for the coke-handling plant was obtained by Messrs. W. J. Jenkins and Co., Limited; and it is on the De Brouwer system, with which readers have been made well acquainted by repeated reference in these columns. It was only started the second week in October; but, during our inspection the other day, an inquiry was put to Mr. Smith as to his experience with it. His reply was that he has not had it in use a sufficient length of time for him to express a positive opinion; but, so far, he has nothing but praise for it. For simplicity and convenience, he does not know another conveyor which is its match; and, as to wear and tear, he thinks the angle runners, which are easily renewable, and comparatively inexpensive, will keep down the item for repairs. In his view, it does not very much matter whether wheels or skidder-bars are used; with either, there must be considerable wear in dealing with such an emery-like substance as coke.

The coke-conveyors on either side of the retort-benches consist of a trough, 2 feet wide between the angles, formed of ¼-inch steel bottom plate, with 5 inch by 3 inch by ⅜ inch angle steel riveted along the sides. Inside the trough is placed Jenkins's patent renewable bottom-plates (¼ inch thick), over which and supported to the side angles are the renewable runners (3 in. by 2½ in. by ⅜ in.) for supporting the chain. The chain is made of the best steel stampings—block links alternating with double links; the former being made specially high to take all the wear due to the rubbing on the wearing strips of the pan. The double links are connected in such a manner that the wear comes upon the full width of the portion passing through the hole in the block link. They are held together by rivets, which are easily removed, while being perfectly secure, and forming no part of the wearing surface. The two chains are held apart by ⅞-inch round iron stays, at intervals of 2 ft. 1½ in. longitudinally, for the transmission of the coke along the conveyors. All this shows that the makers of the conveyor are doing everything possible to reduce to a minimum the cost of maintenance.

In its travel along the longitudinal conveyors, the coke is partially quenched by the water in the trough; and then outside the retort-house—the conveyor sloping upwards at an angle of about 30°—the water which is carried forward by the motion of the coke flows back over it, and completes the quenching. At the top of the sloping conveyor, the coke is delivered on to a cross conveyor—the chain returning round a pair of flanged rollers, being guided round the bend in the conveyor by a second pair of flanged rollers, and passing round the driving-wheel on to tension pulleys. The return chain is supported by angle steel guides running the full length of the house, and supported from the floor girders by angle brackets. The total length of the conveyors is about 450 feet.

The outside cross conveyor to which reference has already been made runs the full length of the yard and over the adjoining canal basin (a distance of 174 feet); being supported on steel girder structures. The coke can be delivered at intervals from this, by means of shoots, on to a travelling conveyor (of a length of 79 feet), for distribution in the yard or on to the opposite side of the canal basin. This travelling conveyor is moved in a parallel direction along gantries by means of hand propelling gear. At the end of the travelling conveyor, there is a very neat arrangement for screening the coke and loading it into barges with little damage and without any handling whatever. This is an inclined shoot with a bottom formed of taper screen-bars placed on edge. The bars at the top separate the dust from the coke, and the lower ones the breeze; and there are shoots below the screen to direct the breeze and dust into their respective compartments of the hopper. Then there is a device, consisting of forks and plates attached to a travelling chain, for regulating the speed of the coke down the shoot, in order to prevent it being crushed by a violent passage into the barges. A similar screen is placed under the cross conveyor, to separate the dust and breeze from the coke delivered into waggons. The plant is driven by a "National" gas-engine of 30 brake horse power, situated in a small house, which has been specially constructed in a corner of the coal-store at the nearest point to the canal. As in the case of the other contractors' work, so in this—Messrs. Jenkins and Co. have done their utmost to merit the confidence of the Corporation Gas Committee and their Engineer.

We think this completes all that need be said in a general descriptive account of the section of Mr. Smith's large scheme of improvement which has connection with the work of the retort-house. Much more could be written; but the article has already extended to a considerable length, though not to greater length than the magnitude of the work deserves. We cannot conclude this first notice, however, without expressing our thanks to Mr. Smith for giving us the opportunity of inspecting the new plant, and for supplying a splendid series of photographs for its illustration.

(To be continued.)

In various parts of England, gas engineers have—in view of Mr. W. A. M'Intosh Valon's approaching retirement from the office of Gas and Water Engineer of Ramsgate, in order to devote himself fully to his consulting practice—been watching with interest our advertising columns for the invitation to apply for the vacancy, as it is believed that the position of Gas and Water Engineer and Manager at this popular seaside resort will bring out a large number of candidates. The appointment is advertised in the present issue; and it will be seen that it becomes vacant on Sept. 25. There is to be a change in the conditions of service. Private practice will not be allowed; and whoever is selected will have to devote the whole of his time to the duties of the office.

NOTES.

The New French Patent Law.

Inventors should take notice that new French patent regulations have come into force this year. The alterations concern exclusively the drawings and descriptions of inventions. The chief interest of the new decree for amateurs of patent systems lies in the fact that it maintains unaltered the chief features of the French system, which frequently form the subject of discussion. Thus, the patent is not guaranteed by the Government, which grants it at the risk and peril of the applicant, and insists that the absence of such guarantee should wherever practicable be proclaimed by the initials "S.G.D.G." upon the patented article. The net charge for a French patent is 500 frs. (£20) for five years, with an equal additional charge for every five years afterwards, up to fifteen years. The tax is payable by annual instalments of 100 frs., in advance. The obligation to work the invention in France within two years remains an essential condition of the validity of the patent right; and it is to be noticed that this must be a real working of the invention, and that merely "working a patent," in the sense of dealing with it in the country by way of financial transaction, will not satisfy the Courts.

The Protective Range of Lightning Conductors.

A pertinent query respecting the value of lightning conductors has been put in the "Standard" by the Rev. H. W. E. Moloney, of the Vicarage, Ilford. Recently a house in Gordon Road, Ilford, was struck by lightning. Close to the house stands the Gordon Hall, with a tower to which a conductor is attached. The conductor is only 72 yards distant from the chimney which was struck, and the tower with the conductor must be fully 25 feet higher than the chimney-pot. According to all expectation, the lightning should have left unharmed the lower building at so short a distance from a conductor. Mr. Moloney therefore feels constrained to ask what radius of protection is secured by a conductor. Is a large building sufficiently protected which has a lightning conductor attached to the highest point, which may be more than 100 feet distant from the extremities of the building? The question is of cardinal importance in regard to large works, where buildings clustered underneath the imagined protection of the chimney with its lightning conductor are commonly regarded as safe. No complete answer has been given to Mr. Moloney's inquiry; the truth being that the once prevalent idea respecting the extent of the protection afforded by a lightning rod has been relinquished in consequence of the prevalence of such phenomena as Mr. Moloney records. Until the new matter now being collected has been digested by the Lightning Rod Committee, it seems safe to hold that the protection given by lightning rods is very local, which means that the roofs of all exposed buildings should be protected by conducting networks.

New Meteorological Instruments.

Messrs. Gallenkamp and Co., Ltd., of London, have brought under our notice a set of new instruments for the determination of atmospheric humidity and the dew-point. One of these is called "Lambrecht's Polymeter," which is described as a miniature meteorological observatory for scientific, industrial, and hygienic purposes. There are, of course, many purposes for which the determination of the humidity of the atmosphere is useful. The polymeter is a combination of the thermometer and the air-hygrometer, and carries two scales. On the left-hand side of the thermometer-tube, there is the usual scale of temperature in degrees Fahrenheit; and on the other side a scale shows the elastic force of vapour in millimetres of mercury. The hygrometer has also two scales, one for percentages of moisture, and the other for constants to be used in arriving at the dew-point. Various data can be obtained from these indications by inspection and simple calculation. Dr. Fleischer's rule for a healthy state of the atmosphere is that there should never be more than 70 per cent., nor less than 40 per cent., of humidity in an interior; and the dew-point should be between 48° and 54° Fahr. Thus for ordinary observations of the effects of ventilation or the burning of gas in an apartment, it is only necessary to take the temperature, dew-point, and relative humidity. Another instrument for showing the dew-point is Lambrecht's dew-point mirror, which consists of a stand for a thermometer and a drum. By this means, a positive dew-point observation can be made at any moment, without the necessity for computation. The lowering of the temperature of the drum is effected by the evaporation of ether, and the dew-point is signalized by the actual appearance of cloudiness on an attached mirror. It is claimed that an improved system of weather forecasting can be based upon the indications of these instruments.

The Ventilation of Dwelling Houses.

Mr. E. W. Mayner read a paper on the "Ventilation of Domestic Dwellings" before the Institution of Heating and Ventilating Engineers at the last annual meeting. The author brought in many of the old familiar statements respecting the necessity for changing the air of occupied interiors, and remarked that the quantity of fresh air required to be provided for this purpose has been steadily rising in modern ventilating practice. A few years ago, 300 cubic feet per head per hour was considered sufficient; whereas at the present time 1500 cubic feet per hour per head is recommended. The difficulty is to provide this inflow without causing the sensation of draught. People differ greatly in their ideas of what constitutes a draught, some not minding a current of air travelling at the rate of 6 or 7 feet per second, while others think 3 or 4 feet per second a terrible draught. Looking at the ordinary open fire-place as the natural ventilator of an apartment, the author recommended the provision of a fresh air inlet in the outer wall about 4 feet from the floor, on the same side as the fire-place, with the opening into the room at least four times larger than that outside. Both sides should be covered up with fine copper wire gauze, so as to keep out insects and break up the stream of air. The inside opening can always be covered over with a picture or piece of furniture, allowing sufficient room for the air to enter. The outside opening of such ventilators should be hooded, or else rain will beat in and make the wall damp. Valves should be provided to check the flow in case of high winds blowing directly upon it. Mr. Mayner laid stress upon the desirability of having doors and windows left open on every possible occasion, to aid the ventilation. He also made a point of the frequent airing of cupboards and linen closets. Summing up, he declared in favour of inlet and outlet ventilators of sufficient area constructed to meet general requirements. Where possible, every room should have its own ventilating shaft carried almost as high as the chimney-top, and have a regulating extractor ventilator fixed in it near the ceiling.

Mr. G. B. Smedley, of New Mills, has been appointed Gas Manager to the Swadlincote Urban District Council, in succession to Mr. Hardy.

Mr. A. Boyd M'Crae, son of the first Manager of the gas-works in Dundee, and brother of the present Manager, died at his residence in Monifieth last Wednesday morning. He was for a long time a representative of the Fife Coal Company, and was well known in Fife and Forfarshire. His end came suddenly, for, though he had been ailing for some time, he was out on Tuesday. He was 44 years of age.

We have received the "Transactions" of the Society of Engineers for the past year. The volume contains the papers read at the meetings held in the past session under the presidency of Mr. Charles Mason, together with an account of the vacation visits. A paper by Mr. Sydney A. Hollis, on "Preliminary Investigations for Water Supply" gained for its author one of the Society's premiums of books. The useful general index to the "Transactions" from 1857 has been brought up to date; and the whole contents of the volume have been edited by the Society's Secretary, Mr. Perry F. Nursey.

The Chairman of the Continental Incandescent Gas Company, Limited, informs us that the litigation in which his Company have been concerned with the Welsbach Company was settled, on mutual terms, before Mr. Justice Bucknell, last Thursday. Mr. Neill (instructed by Messrs. Armitage and Strouts) appeared for the Continental Company and consented to an arrangement whereby the injunction obtained by the Welsbach Company was dismissed, and a license accepted on the terms, *inter alia*, that all litigation against the customers of the former should cease—the parties bearing their own costs.

The spring meeting of the Midland Association will be held at Malvern on Thursday of next week. We learn from the programme issued by the Hon. Secretary (Mr. A. Cooke, of Oldbury) that the members will meet at Malvern Link Station at about half-past eleven o'clock. Carriages (provided by the Malvern Urban District Council) will be in waiting to convey the party to the gas-works, where an inspection of the recent alterations and extensions will be made, under the guidance of Mr. H. P. Maybury, the Gas Engineer to the Council. After this the members will drive to Madresfield Court, the residence of Earl Beauchamp, K.C.M.G., who has very kindly thrown open his grounds, &c., to the Association. The drive will then be continued to the Imperial Hotel, Great Malvern, where the Association will be entertained to luncheon by the Chairman and members of the Council. A drive will afterwards be taken round the hills; and at Bristol Camp Hotel Mr. and Mrs. Maybury will offer the party tea.

At the meeting of the Southport Town Council last week, the Mayor (Mr. C. Scarisbrick) presented to the ex-Mayor (Dr. Isherwood) a silver casket, containing a scroll, in testimony of the regard and esteem of his colleagues. Dr. Isherwood became a member of the Council on Dec. 23, 1890; was Chairman of the Library Committee from 1894 to 1897, of the Health Committee from 1897 to 1898, of the Gas Committee from 1899 to 1900, and Mayor in 1900-1. Among the duties he performed during his mayoralty were the opening of the destructor works and the inauguration of stoking machinery and coke handling plant at the gas-works. In making the presentation, the Mayor said he thought he was voicing the feeling of the Council and the Borough when he stated that in all his duties Dr. Isherwood had displayed the strictest impartiality in the mayoral chair, and had earned the confidence of the Council by the conscientious discharge of his duties. Dr. Isherwood expressed his sincere thanks to the Council for their very beautiful present, and for the many kindnesses he had received from them from time to time.

TECHNICAL RECORD.

WATER GAS MANUFACTURE IN THEORY AND PRACTICE.

By Dr. J. Kramers.

[Abstract Translation of a Communication published last year in "Het Gas."*]

Introduction.

The last word on the theory of water gas has not yet been said. In text-books and pamphlets, it is called very simply "The gas which results when steam is passed over red-hot coal;" and so long as nothing further is said, this is quite correct. But if chemical formulæ are asked for, it is more difficult to give an answer. It could certainly be said that $C + H_2O = CO + H_2$; but actually this does not happen exclusively, as is shown by the fact that the composition of water gas is by no means 50 per cent. CO and 50 per cent. H_2, as this formula would require. Moreover, it is impossible to work for a long time according to this reaction, because the fire would be extinguished. Granting that the loss in heat is restored, with the most recent apparatus, according to the equation $C + O_2 = CO_2$, whereby a large number of calories are liberated, yet this represents an ideal which is aimed at, but is not easily attained. In the following, an attempt will be made to give a review of the various reactions concerned, and to trace the theoretical and practical conditions under which the ideal conceived can be approached as closely as possible.

Various Data.

Before proceeding to the theory proper, certain figures must be assumed and postulated. These figures are not given as absolutely corresponding to the actual facts, but only the most probable approximations at the present time to the latter. They will have to be introduced throughout the subsequent review of the subject, in order to avoid confusion. It is to be assumed, then, that when 1 kilo. of carbon is burnt to carbonic acid, 8137 heat units or calories are liberated—taking it for granted, however, that the combining bodies (carbon and oxygen) are at 0°C., and that the products of combustion escape at 0°C. In the sequel, the molecular quantity will always be taken, which for carbon is 12 kilos. Under the given conditions, then, $12 \times 8137 = 97{,}644$ calories are liberated; and this is expressed by:

$$C + O_2 = CO_2 + 97{,}644 \text{ cal.} \quad (1)$$

If CO is burnt to CO_2, then

$$CO + O = CO_2 + 67{,}968 \text{ cal.} \quad (2)$$

From (1) and (2), it follows that:

$$C + O = CO + 29{,}676 \text{ cal.} \quad (3)$$

If hydrogen is burnt to liquid water at 0°C., then

$$H_2 + O = H_2O + 68{,}317 \text{ cal.} \quad (4)$$

To convert liquid water at 0°C. into vapour at 0°C., there are required $18 \times 606{\cdot}5 = 10{,}917$ cal. (taking, with Regnault, the total heat of evaporation of water at 606·5 + 0·305 T per kilo.; T being the temperature of the aqueous vapour, and thus starting from water at 0°C.). On burning hydrogen, therefore, to water vapour at 0°C., it follows that:

$$H_2 + O = H_2O + 68{,}317 - 10{,}917 = H_2O + 57{,}400 \text{ cal.} \quad (5)$$

As, when two substances are combined to form a third, heat is liberated, so the dissociation of the latter into the first two substances will require just as much heat. So that, *e.g.*,

$$CO_2 = C + O_2 - 97{,}644 \text{ cal., \&c.}$$

The specific heat of the various substances plays an important part in the theory of water gas. Unfortunately, there is a great variation in the values ascribed to the specific heat of two substances which are here of the greatest importance—viz., carbonic acid and steam. They have been reckoned here only for the molecular quantity. For CO_2 at a constant pressure, we have:

$$W = 8{\cdot}272 + 0{\cdot}013112\,t - 0{\cdot}0000023628\,t^2 \quad (6);$$

and for steam,

$$W = 7{\cdot}56 + 0{\cdot}006552\,t \quad (7).$$

It must be observed here that the values obtained according to these formulæ represent the average specific heat between 0° and t°. In default of anything better, the specific heat of carbon is taken simply as 0·2, and, therefore, for the molecular quantity $W = 12 \times 0{\cdot}2 = 2{\cdot}4$. The specific heat of the other gases, besides carbonic acid and steam, which come into consideration, can be taken as constant at all temperatures concerned. Let it be assumed that:

For H_2	$W = 6{\cdot}82$
For N_2	$W = 6{\cdot}83$
For O_2	$W = 6{\cdot}95$
For CO	$W = 6{\cdot}86$

* The author has used throughout chemical symbols in place of the names of elements and compounds; and though such use is open to serious objection, and is contrary to our usual practice, it has been retained *for the sake of brevity* in this translation.—Ed. J.G.L.

The Chief Reactions.

Whatever the secondary reactions may be, and whatever intermediate reactions take place, the result of passing steam over incandescent coals must be that H_2O and C are converted into H_2 and CO, and the heat balance for this can be made up with the help of equations (3) and (5), which give:

$$H_2O + C = H_2 + O + C - 57{,}400$$

and $$H_2 + O + C - 57{,}400 = H_2 + CO + 29{,}676 - 57{,}400,$$

or $$H_2O + C = H_2 + CO - 27{,}724 \quad (8).$$

This is, however, not quite correct; for the assumed figures apply when the transformation takes place at 0°, which is certainly not the actual case. As will be seen later, it is desirable for the temperature of the generator where the gas is being produced to be at least 1000° C.; and this temperature will therefore be taken as the mean.

The question now is: What will equation (8) be at this temperature. In order to ascertain this, it may be argued: If H_2O and C at 0° be converted into H_2 and CO (supposing that were possible), this requires a certain number of calories (27,724); and on heating the gases which are formed (H_2 and CO) to 1000°, a certain number of calories are likewise necessary—*e.g.*, *a* cal. Altogether, there are therefore required $27{,}724 + a$ cal. to convert H_2O and C at 0° into H_2 and CO at 1000°. It would be the same (as far as the number of calories required is concerned) if the chemical transformation took place first, and the gases formed were then heated to 1000°, or if the substances were first heated to 1000° and the chemical transformation were then effected; so that if *b* represents the number of calories required to heat the substances carbon and water vapour to 1000°, and W the number of calories requisite to effect the conversion at 1000°, it would become: $27{,}724 + a = b + W$. Here W alone is unknown; for *a* and *b* are to be found from the specific heat of H, CO, C, and water vapour. For *a* we have thus:

$$1000 \times (6{\cdot}82 + 6{\cdot}86) = 13{,}680 \text{ cal.};$$

and for *b*

$$1000 \times (2{\cdot}4 + 14{\cdot}112) = 16{,}512 \text{ cal.}$$

So that $$W = 27{,}724 + 13{,}680 - 16{,}512 = 24{,}892;$$

and therefore equation (8) becomes for 1000°:

$$H_2O + C = H_2 + CO - 24{,}892 \text{ cal.} \quad (9).$$

This would be the case if the gases on leaving the generator had actually a temperature of 1000°. According to Strache's experiments, however, their temperature would be appreciably lower—in fact, 500° to 600° lower than the temperature of the generator. If this is really the case, the only explanation which can be given is that a portion of the heat required for the dissociation is withdrawn from the substances which immediately before were already converted (in this case H_2 and CO). This circumstance should help the heat balance; for, assuming that the steam is really supplied at 1000°, and the gases H_2 and CO together are taken off at 500°, then *a* would be one-half less throughout, and *b* would remain unchanged. Thus:

$$W = 27{,}724 + 6840 - 16{,}512 = 18{,}052 \text{ cal.};$$

so that the equation becomes:

$$H_2O + C = H_2O + CO - 18{,}052 \text{ cal.} \quad (10).$$

According to the equations (8), (9), and (10), water gas should consist of 50 per cent. of H_2 and 50 per cent. of CO. In practice, however, it is otherwise; for water gas always contains a greater or smaller percentage of CO_2, independently of the temperature of the generator or of the rate of flow of the steam. While not wishing to discuss for the moment the theoretical explanations of the presence of CO_2, the formation of the CO_2 may be provisionally represented thus:

$$C + 2\,H_2O = CO_2 + 2\,H_2 \quad (11).$$

For drawing up a heat balance, it is immaterial whether the formation according to this formula be accepted or not, as, for a thermic calculation, only the initial and final conditions are concerned. According to equations (1) and (5),

$$C + 2\,H_2O = C + O_2 + 2\,H_2 - 114{,}800,$$

and $$C + O_2 + 2\,H_2 - 114{,}800 = CO_2 + 2H_2 + 97{,}644 - 114{,}800,$$

or $$C + 2H_2O = CO_2 + 2H_2 - 17{,}156 \text{ cal.} \quad (12).$$

Here also, as with equation (8), it is supposed that the reaction takes place at 1000°. Assuming thus that C and H_2O at 1000° are supplied, and the gases CO_2 and H_2 escape at 500°, C and 2 H_2O respectively liberate; 2400 and 28,224 cal., together 30,624; while $2H_2$ carries off $2 \times 500 \times 6{\cdot}82 = 6820$, and the CO_2 $500 \times 14{\cdot}2373 = 7119$, together 13,939. Thus there should be obtained:

$$C + 2\,H_2O = CO_2 + 2H_2 - 17{,}156 - 13{,}939 + 30{,}624,$$

or: $$C + 2\,H_2O = CO_2 + 2\,H_2 - 471 \quad (13).$$

On passing superheated steam (1000°) over incandescent carbon, the reactions shown in equations (10) and (13) are, as to the final result, the principal reactions; and, with a good arrangement, reaction (10) must get the better of (13). It is thus evident that there is a deficiency of calories, even if the steam is heated to 1000°, and if it is accepted that the gas is carried off at 500°. After a certain time, therefore, so much heat will be withdrawn from the generator that the gas making will have to be stopped, and a new supply of heat given to the generator by the so-called "blow." What reactions take place in this blow? Air only is

blown in—that is to say, a mixture of 1 part of oxygen to 3·7619 parts of nitrogen. The carbon will burn; but that can happen in two ways. Thus:

$$C + O_2 = CO_2 + 97{,}644 \text{ (14), and}$$
$$C + O = CO + 29{,}676 \text{ (15).}$$

If the C and O are not heated previously, there will be liberated, on combustion, 97.644 and 29,676 cal. respectively. More correctly, the products of combustion are the carriers of the heat or calories liberated on combustion. But a certain number of the calories will go over to the carbon (the fire), and this will therefore rise in temperature. If it is accepted, that the products of combustion escape at 500° C., and that the air is supplied at 0°C., then the number of calories liberated, less the number of calories carried off, will come to the benefit of the generator. If the combustion takes place to CO_2, then the CO_2 carries off 7119 cal., and the admixed nitrogen 12,847 cal.; thus leaving

$$97{,}644 - (7119 + 12{,}847) = 77{,}678 \text{ cal. (16).}$$

If the combustion takes place to CO, the CO carries off 3430 cal., and the N_2 6424 cal.; thus leaving:

$$29{,}676 - (3430 + 6424) = 19{,}822 \text{ cal. (17).}$$

The advantage of (16) over (17) is at once apparent; and efforts should therefore be made to obtain combustion to CO_2. It will be seen later what difficulties this entails, and how they can be overcome.

The four equations which concern the water-gas process having been briefly stated, attention may now be given to the so-called "run," or make of gas.

The "Run."

It will be assumed, as heretofore, that carbon is being worked with, and therefore it will not be considered what the effect would be of using coal in place of simple carbon. It must first be determined so to arrange the "run" as to obtain as little CO_2 as possible; for a high proportion of carbonic acid in the gas is very objectionable, and means of getting rid of it are costly. In order to obtain only a small percentage of CO_2, a high temperature of the generator is required. In 1885, various tests were undertaken by A. Naumann and C. Pistor, with the object of placing the theory of water-gas on a scientific basis. Before forming an opinion as to the chemical actions, they proposed to obtain answers to the following five questions by experiments.

1.—What is the lowest temperature, and what are the conditions, under which carbon reduces carbonic acid to carbonic oxide?
2.—Is carbonic acid reduced by hydrogen to carbonic oxide, and what is the lowest temperature, and what are the circumstances which favour this reduction?
3.—Does an interaction between carbonic oxide and water vapour occur; and what is the lowest temperature thereof?
4.—What are the products of the action of water vapour on incandescent coal—and how does the formation of these products depend on the temperature and on other circumstances?
5.—How does a mixture of water vapour and hydrogen behave towards carbon at various temperatures?

This was their scheme; but it was not fully carried out immediately. The first three questions were answered in 1885; and the results will be made use of here later. But the fifth question has up till now never been answered; and the fourth was only answered to a small extent three years later—not by Naumann and Pistor, but by J. Lang, although probably under the guidance of Naumann, as the experiments were made in his laboratory. Lang drew up another programme, and investigated successively.

1. The action of methane on carbonic acid.
2. ,, ,, water vapour.
3. ,, of oxygen on carbon.
4. ,, of water vapour on carbon.
5. ,, of carbonic acid on carbon.
6. ,, of water vapour on carbonic oxide.

The reactions of methane may be passed over (or may perhaps be returned to later), as for the moment they are of no interest. The action of oxygen on carbon will come in conveniently with the "blow," and with the theoretical considerations. The three remaining reactions agree respectively with questions No. 4, No. 1, and No. 3 of Naumann; and as the action of water vapour is of the most importance in studying water gas, that will be taken next.

(To be continued.)

OHIO GASLIGHT ASSOCIATION.

(*Continued from p.* 1288.)

Coke Handling.

A discussion on this subject was commenced by Mr. K. M. Mitchell, who claimed that it was possible to sell all surplus coke in the district where it was made. Lump coke should realize 6s. 3d. per ton more than soft coal, and small coke a little less than anthracite. At St. Joseph's (Mo.), with one exception, they had not carried a ton of coke forward from one year to the next, for seventeen years. They purchased a crusher, fixed it on the top of the coke-shed, and elevated the coke to the hopper of the crusher by means of buckets attached to a belt elevator. The crushed coke fell on stationary screens, inclined at the proper angle. They made three sizes—egg, nut, and pea coke. The bucket elevator gave trouble from wear and tear and occasional choking; and the plant was reconstructed throughout, in the light of experience. The crusher was placed at an altitude of 40 feet, and operated by a small steam-engine, and circular revolving screws were adopted. The bucket elevator was replaced by a lift. The cost of elevating and crushing was about 2s. per ton. He endeavoured to encourage domestic consumption by every legitimate means—such as advertising, canvassing, and prompt and careful delivery, by obliging carters. He also sold stoves specially suited for coke, and sent out experienced men to advise on its use if required. He was often asked if a coke fire would keep alight all night. If this was required, the fire hole should be large and deep, with a shaking grate and poker hole at the grate level and a charging door on top of the stove. He claimed that coke was the most valuable domestic fuel on the market. Mr. Irvin Butterworth, of Denver, said that the whole product of coke could not be disposed of in districts where natural gas was abundant; but he agreed that a large and profitable trade could be developed by working on the lines indicated. It was necessary to provide the sizes in demand; and sometimes a screen would answer every purpose. At Denver, he was able to supply all the small coke required by using a shaking screen actuated by electricity. At Milwaukee and other places, screens were found sufficient. These did not make so much dust and small as a crusher; so he advised using screens as far as they would go, and the crusher as supplementary when required. Coke should be stored dry and clean in overhead bins, be delivered free from snow, water, or dirt, and sold direct—not through a contractor. At Denver, samples were exhibited at the branch offices where gas accounts were payable; and a commission was allowed on orders obtained. They employed a competent man to devote his entire time to the development and management of their coke business, and made it a point not to have a single dissatisfied customer. Mr. Whyeall agreed in taking some trouble to get a size of coke that was suitable to the make of stove. Egg coke was useless in a small stove. As much attention should be given to the coke department as to any other. He sold the bulk of his coke for foundry purposes; the domestic demand exceeded the supply. Mr. Miller imagined that at Cincinnati one-half of the coke was sold in the district for domestic use.

A Question of Extending Mains.

The next subject taken dealt with the best methods of extending gas-mains, and of reinforcing insufficient pressure in particular parts of a district. It was introduced by Mr. John Franklin, of Cincinnati (Ohio), who gave some particulars of his experience in introducing gas into five outlying villages. Having acquainted himself with the present and future probabilities of business, he proceeded to endeavour to secure the interests of the residents and property owners in favour of a franchise to be granted to his Company. The district was carefully surveyed and plotted out on a scale of 200 feet = 1 inch, showing all the houses and buildings; and registers showing the size and other particulars of houses in each street were prepared. A thoroughly suitable and competent canvasser was employed, and furnished with application forms, rules, regulations, &c. These he distributed house by house, correcting his list of owner and tenant while so doing, and immediately followed on with a second round of visits, either obtaining signed forms, or a reason for refusal. In many cases those who could not be secured on the second round, might be gathered into the net on the third or subsequent visit. The forms and other particulars gained by the canvasser were then taken in hand by the superintendent of distribution, who judged from them the size of mains to be laid, which side of street, and other details. Several working details were then considered. For a large extension of from 4-inch up to 12-inch pipe, a gang comprising fifty labourers, two pipe handlers, one yarner, four caulkers, one lead joiner, and one blocker, was recommended. Each labourer should be given a section 12 feet long to work on; and with average working, each man would open three such sections per day of ten hours—making 600 yards per day in all. The best men should be kept in the rear, so as to enable the pipe laying to be proceeded with as soon as possible. Directly the pipe was laid, some of the worst men should be brought back from the front to fill in; the others being moved forward in their place. When about 12 inches of material had been filled in, it was a good plan to flush the trench well with water, and to make holes with bars down to the pipe, so as to allow loose soil, &c., to be firmly packed. The trench should then be filled up flush with the surface and allowed to stand overnight. In the morning, it should be well rammed; and the top dressing with metal could then be added. By this means, nearly the whole of the spoil could be got back into the trench. He preferred leaving the connection with the live main until the last, as if gas was in the pipe, there was always a risk of leakage past the bag or bladder, and of explosion by a spark from a pick. The quantity of pipe laid each day by a gang as above mentioned should not be less than 1600 feet of 4-inch, 1200 feet of 6-inch, or 1000 feet of 12-inch. The work should be tested for soundness with an air-pump under 7 lbs. pressure—a spring pressure register being used. Ordinary bladders were satisfactory for pipe smaller than 6 inches; but for larger pipes, rubber bags were necessary. If the main was large, or the pressure high, a wise precaution

was to use two bags. In setting out mains, care should be taken to avoid dead-ends or uncirculated points; branches for side streets should not be less than 4 inches. He believed in large mains and ample supply pressure; and if the work was efficiently done, any reasonable increase of pressure would not increase the leakage. All pipes should be carefully examined and tested with a hammer, also wiped out clean inside, and be laid to a gradient of not less than 4 inches per 100 feet, which should run towards the inlet end wherever practicable, so as to reduce the number of drip-boxes required. It was a good plan to provide a piece of 1½-inch pipe as a protection to the suction pipe on the top of a drip-box, and to fill in the space between the two pipes with hot pitch. A short connecting piece should be fitted to take the pump. The advantage of this plan was that, when the thread became damaged or worn by the frequent application of the pump, a new connection could be put on without digging up the street. Each joint should include 1 inch of well-packed tarred yarn, and 2½ to 3 inches of lead. Service-pipes should be coated before use, by being dipped, while quite dry and warm, into a hot solution prepared by adding 1 gallon of turpentine and 1 lb. of pure rubber to a barrel of boiled tar. An apparatus, comprising a trough heated by steam and a draining rack, was described. Each length of pipe was plugged and capped at either end before dipping. He laid no service smaller than 1¼ inches, and preferred side holes and a straight run to top holes and bends. In dealing with cases of insufficient pressure, the first thing was to get a proper record throughout the whole district, taken at time of heaviest consumption. Some particular obstruction or defect might thus be localized; but beyond this, the only remedy was a special trunk main or feeder from the works.

Mr. B. W. Perkins concurred in a general way with the preceding, but added that, in the case of a long run, it was now a question whether the low or the high pressure system should be used. He preferred stamping down well on each side of a main when filling in, to the plan of flushing. Two gas-bags in the case of a 10-inch or larger pipe was a wise precaution; and the hammer test for soundness was not infallible. In levelling, an architect's level on a tripod was a valuable auxiliary. When practicable, he located drip-boxes in the side walks. The clay used for the socket ring or gate might be tempered with lubricating oil instead of water; and stucco was excellent as a material for temporary jointing. Mr. Stone took his levels with an ordinary engineer's level and stakes in the bottom of the trench. At the present time, it was also a question whether wrought-iron pipe was not preferable to cast iron. He found opinions were very evenly divided. One engineer who used both kinds was greatly in favour of wrought iron, because while he had frequent fractures in the cast-iron lines, there was not one with the wrought iron. The heavy expense in connection with repairing fractures was an item. The wrought iron should be protected by coating as described. Mr. J. R. Lynn remarked that good sound joints could be made when tapping wrought-iron pipe. Cast-iron pipe was not always proof against corrosion. He lately took up some that had been covered with cinders, and it was absolutely rotten. He thought any advantage was simply due to extra thickness. The general experience was that leakage was less with a wrought-iron system than with cast iron. Mr. Neeley found that, for natural gas, wrought iron was more durable than cast. He had a line of wrought-iron pipe that had carried 200 lbs. pressure for sixteen years, and only developed two local defects in that time. He had taken up cast-iron pipe in one or two Ohio or Indiana towns that had been laid about a similar period; and it could be cut with a knife. He held that wrought iron was as durable, as tight, and as easily tapped for services, as cast iron. Mr. Littlehales said that a great deal depended upon differences in the soil, and that wrought iron was more susceptible to such differences than cast iron. Service-pipes would frequently be found eaten right through, under gutters, or eaves of a building, and yet be perfectly sound a few feet away.

Differential Rates for Illuminating and Fuel Gas.

The equity, legality, and advisability of charging different rates for illuminating and for fuel gas was introduced by Mr. Emerson M'Millin, who said that the practice was established by custom of many years standing. This did not necessarily prove it to be right; but it was reasonable to assume that the fact of its being demanded by the public, and conceded by the gas companies, proved it to be mutually beneficial. In the early days of the gas industry, the limited sales necessitated comparatively high prices, in order to pay even a very moderate rate of dividend; and obviously the only way to reduce the price without loss was to increase consumption, and to increase the earning capacity of existing plant. This desideratum had been secured by encouraging the use of gas as a fuel—chiefly for cooking. Only a few years ago, the bulk of the gas supply was sent out during the first three hours of the night, and practically none during daylight. A plant equal to the supply of a million cubic feet per day under such conditions, was capable of supplying double the quantity under the existing circumstances of to-day. The capacity of the plant must be equal to the maximum winter consumption; and this was formerly four times the summer demand. But fuel gas was used chiefly in summer, and was therefore provided for with but little, if any, additional investment; and this increased capacity was the principal factor in enabling gas companies to reduce the price of gas. Gas companies now did considerable business throughout all the hours of daylight. It was said that cheap fuel gas was a concession to the wealthy; but the reverse was the case, as thousands of working-class customers were glad to use gas as a fuel, but did not feel able to use it as an illuminant. With the aid of the cooker, gas companies could incur the expense of piping the poor man's house. If there was any discrimination, it should be in favour of those least able to pay; and he claimed that differential prices met that condition. In Detroit, gas was sold, at 4s. 2d. per 1000 cubic feet for lighting, 3s. 4d. for heating and 2s. 6d. for engines. The latter was a special concession to parties who put engines down for natural gas, the supply of which was now stopped; and without it the engines would be useless. While it was an indirect benefit to the community at large, by keeping trade in the place, it did not hurt the other consumers, who would not get gas cheaper if it was removed. As a matter of fact, it smoothed the way for a general all-round reduction and benefited all concerned. Mr. Paul Doty was of opinion that, under present circumstances, differential prices were not needed. At the best they were a business expedient; and whether as such they were strictly legal, he did not pretend to say. But he admitted they were established by custom; and to some extent custom was the law of business. Gas for fuel was no longer an infant industry; and of the two, he thought that gas for lighting now stood the more in need of support and encouragement. The lower rate for fuel must depend to some extent on the fact that a higher rate was received for lighting gas. The ability to sell gas for engines at 2s. 6d. per 1000 cubic feet was due to the fact that higher prices were received for fuel and for lighting gas. They could afford to sell some of their make all the time for 2s. 6d., or all the make for part of the time at 2s. 6d.; but not all the gas for all the time at that price. The President said that, while there was a tendency to uniform prices, such a practice was not equitable, because it was not on the same lines as the costs. The working expenses were affected by the number of consumers, their distance from the works, their maximum demand, and their annual consumption. To be strictly equitable, a fixed charge, covering investment and establishment expenses, should be made to each customer, without regard to the quantity of gas used, equivalent to the "readiness to serve" which had been claimed by electricity companies. In ten years' time, he ventured to predict that no electric company would charge a flat rate. He therefore contended that differential rates, though perhaps not strictly equitable, were nearer in that direction than the flat rates, and they were advisable, and could be sustained in the Supreme Court if properly presented. It was desirable to keep the plant fully occupied, or as nearly so as possible; and the use of fuel gas tended to that end. At Madison (Wis.), the day consumption was such that he was able to work comfortably with 33 per cent. storage capacity; but if the rate was for lighting only, he would require a plant three times the size all round to do a similar extent of business. This would necessitate an increased price, to an extent greater than the differential rate of 25 per cent. for fuel gas as at present allowed. Few of them could sell illuminating gas at present figures if not supported by a good day and summer demand. The Supreme Court and the Interstate Commerce Commission had supported differential rates in the case of railway companies. He proceeded to show that a concession was necessary in the case of fuel gas on economic considerations. Taking gas at 4s. 2d. per 1000 cubic feet, soft coal at 16s. 8d. per ton, electricity at 5d. per unit, anthracite at 33s. 4d. per ton, and kerosene at 5d. per gallon, and assuming the following values—viz., Flat-flame gas-burner, 3 candle power hours per cubic foot; incandescent gas-burner, 20 candle power hours per cubic foot; kerosene, 600 candle power hours per gallon; electricity, 3½ watts per candle power hour by glow, or 1 watt by arc light—for lighting; gas, 650 B.T.U. per cubic foot; kerosene, 150,000 per gallon; soft coal, 30 millions per ton; anthracite, 27 millions per ton; and electricity at 3411 B.T.U. per unit—he arrived at the following comparative costs:—

Lighting.

Gas, flat-flame	1s.	4½d.	per 1000 candle power hours.	
,, incandescent	0	2½	,,	,,
Kerosene	0	8	,,	,,
Electricity, glow	1	5½	,,	,,
,, arc	0	5	,,	,,

Heating.

Gas	5s.	5d.	per million B.T.U.	
Kerosene	2	9	,,	,,
Soft coal	0	6·6	,,	,,
Anthracite	1	2·8	,,	,,
Electricity	121	0	,,	,,

From this, it was evident that with proper enterprise in the way of pushing incandescent burners, gas at any price could hold its own for lighting. But every decrease in the price of fuel gas attracted an increased consumption. The sales for illuminating purposes only would mean some 8s. 4d. per 1000 cubic feet, of which 4s. 2d. would be required for interest. Suppose the rates were doubled by selling fuel gas at 5s. 3d. per 1000 cubic feet, the 1s. profit on the fuel gas would admit of the lighting gas being reduced to 7s. 3d., which would not injure anybody. A uniform charge of 6s. 3d. would not meet the case, because, while the reduction would lead to little (if any) more lighting business, the demand for fuel would be materially curtailed. More profit could be earned on marked differential rates, or the same profit could be secured by differential rates averaging less than the uniform rate necessary to secure it. He therefore urged that differential rates were legal, advisable, and equitable.

(*To be continued.*)

THE USE OF PRODUCER GAS IN ENGINEERING.

Discussion on Mr. Rowan's Paper.

In the "JOURNAL" for the 25th of February, we gave some extracts from a paper on the above subject read by Mr. F. J. Rowan before the Institution of Engineers in Scotland, of which Mr. W. Foulis is President. At a subsequent meeting, the paper was discussed.

The first speaker was Mr. P. N. Cunningham. He said that he quite agreed with Mr. Rowan that a good producer must be capable of being cleaned without interfering with the continuous production of gas, and that no heat or combustible matter should pass away in the ashes made. These conditions were, he thought, fulfilled in the water-sealed gas-producer. He had erected 28 producers on Mr. Duff's principle, and, on the other hand, had altered quite a number of the old Wilson producers to water-sealed bottoms, using a central cone-shaped blower of large diameter with two cones, one placed on top of the other, with a space left between for the air to enter. This arrangement gave a good distribution of the air, and the producer worked very uniformly. Mr. Rowan had referred to generator chambers being underneath the ground. In every case where this could be arranged, it was best; but he had regenerator furnaces working with their chambers on the floor level. This overcame the difficulty of sinking a portion of the furnace much below the level of the floor. He considered gas-furnaces were much more economical than coal-fired furnaces, and thought there was a great future before the use of gas in the treating of materials which were at present heated in coal-fired furnaces. Mr. Cunningham was followed by Mr. C. G. Norris, who testified, from recent experience, to the economy of gas-fired as compared with coal-fired furnaces; the cost of heating a ton of plates being in the former case 4s. 5d., and in the latter 2s. 2d. Mr. J. F. Maclaren, of the Port Eglinton Pipe Foundry, stated that his firm had for years been using gas-producers with anthracite coal and gas coke, and found this to be an economical way of working—only about 1 lb. of anthracite being used per brake horse power per hour. Considerable trouble had, however, been experienced from clinker, particularly with coke; and they had also had annoyance in consequence of tar gathering in the valves of the engines, and putting the latter out of order. In other respects, they had found that, with regular attention and careful handling, producers were very satisfactory.

The next speaker was Mr. Alexander Wilson, Superintendent of the Dawsholm Gas-Works of the Glasgow Corporation. He said his experience of using fuel gas for heating purposes in gas-works was a lengthy one; and a great many different forms of producers were employed. In the works of which he had charge, under their esteemed President, there were more than 200 producers, though many of them were small ones. In the South, the coke was of much higher quality than it was in Glasgow; and consequently it was more easily dealt with—there being less ash. At the same time, there was a good deal of trouble with clinker; and therefore he was surprised to find that, with the high percentage of ash, so little clinker was produced in Glasgow. Mr. Foulis had put down some large producers to take up the work of those of smaller size, with a view to saving fuel and having fewer attendants. When they were started, there was trouble with the clinker, and several alterations were made—always, however, on the right lines; and now very good results were obtained, in saving both fuel and labour. These producers had rose-headed blowers similar to those in use in iron-works. The clinker was now very easily dealt with, and the coke that was used produced very clean fuel gas. He was rather surprised to hear of the trouble experienced by Mr. Maclaren with the tar from anthracite. He thought that fuel gas from coke was far better to work with than fuel gas from coal. It was a much cleaner gas, and there was no trouble either with the bye-products or with taking out the tar. A great deal depended upon the way in which the blowers were used, of whatever form they were. If the clinker was likely to be troublesome, it required that the steam should be put in, in proportion to the air, to suit the fuel. Producers were often left to men who had very little notion of the way to treat them; but if a little attention was given, there was not nearly so much trouble afterwards. Mr. R. T. Napier asked Mr. Wilson if, in the case of the best modern producers, it was necessary to keep up the blast during meal hours, or if the producer could be shut off and started again without loss of time. Mr. Wilson replied that steam was shut off for eight hours on Sunday, and the producers were allowed to rest for the full eight hours. There was a little air going through, but only a very small quantity.

Mr. Wilson was followed by the President, who said the subject before the members was one which had engaged his attention for a very long time. It was about 1882 when he first began, in conjunction with the late Sir William Siemens, to apply gaseous heating to gas-retorts. Each oven, which contained at that time eight retorts, had a producer placed in front of it, into which the hot coke was drawn from the retorts. At the outset, there was considerable trouble with the clinker—no steam being used. They tried at first to get the clinker to run, but this was a complete failure; and it was only after a number of experiments that they succeeded in getting the producers to work satisfactorily with great advantage in the saving of fuel. Since that time, different producers had been experimented with in many ways. The latest were those mentioned in the paper. They were placed outside the retort-house, and the gas was conveyed to the ovens in flues, and distributed among the different settings of the retorts. This system had proved so successful that it was now being extended. At the new works which he was building at Provan, the whole of the retorts were to be heated in this way. There was no difficulty whatever, when coke was used, in regulating exactly the quantity of gas made to what was required, whether the gas was used for heating purposes or for the production of power. He did not think anyone who had had experience of heating by means of gas instead of open fires would for a moment think of returning to the latter method. The cleanliness and the regularity with which heat could be obtained with gaseous fuel were so great, and resulted in such an immense saving, not only of fuel but of wear and tear and labour, and in many other ways, that there could be no doubt whatever that gas would be the fuel which would be used in the future. He thought that time was coming fast.

In the course of his reply to the various speakers, Mr. Rowan expressed his pleasure at finding that the general opinion appeared to be that firing by means of gas was coming into favour. It was many years since he had worked pretty hard at the introduction of gas fuel; but he must say that in the early days coal was very much cheaper than it was now, so that there was not much encouragement for the adoption of economical methods. Of late years, however, something like a coal famine had come upon them, and manufacturers had learned to consider what might happen in the case of another famine, or of a serious strike. He had not the slightest doubt that the opinions expressed by Mr. Cunningham, the President, and other practical men, that the use of fuel gas was the best method of heating, would become more general. He felt inclined to go a step further, and say that it was the only rational method. For power purposes, at present, it had rivals; but from the point of view of economy, the time was coming, he had not the slightest doubt, when it would be able to hold its own very distinctly in that field also. Mr. Maclaren's remarks as to the trouble from clinker and tar had been almost entirely answered. He, personally, could not understand how there should be any trouble from tar, where either coke or anthracite coal was used in the producer, there being no hydrocarbons in either form of fuel. Where bituminous coal was used, there was a distillation of volatile hydrocarbons taking place on the first application of heat to the fuel, and these hydrocarbons formed tar on cooling the gas. Tar had in many instances been very successfully removed by condensation, and he thought it would very soon be the fact that by some modification of the producer itself the quantity of tarry matter produced from bituminous coal would be very greatly reduced, if not entirely eliminated. Mr. Wilson's remarks about producers, and those of the President about the gradual changes taking place in the equipment of gas-works, would be found to point to what would take place not only there but in other works where producers were wanted in numbers—that was to say, there would be a tendency towards having large units. There was no difficulty at all, as Mr. Napier would have gathered from the discussion, in shutting down a producer for an hour; and certainly none in shutting one down for a whole night. It was quite easy to stop producing gas at any particular time.

In proposing a vote of thanks to Mr. Rowan for his paper, the President said he wished to make a remark to supplement what he had already said, more particularly in reference to Mr. Maclaren's difficulty. He could quite conceive that a little tar might possibly be mixed with gas coke. A small quantity of tar often dropped from the mouthpiece, and it was almost impossible to separate it from the coke. It was not much, but it might have the effect of clogging the valves of the engines after a time. Where gas was applied for the purpose of heating, it was of great advantage to purify it. He had put up a dust-chamber in connection with the producers he had, so as to remove the whole or the greater part of the dust from the gas immediately after it left the producer. He thought this was necessary when the gas was carried any distance in flues, more especially when coke was used. In the case of engines using producer gas, it was necessary to cool the gas to the atmospheric temperature; and the best way to do this was to pass it through a washer, and wash it with water. If this were done, the whole of the tarry matter would be removed, and the gas would at the same time be cooled down to the proper temperature.

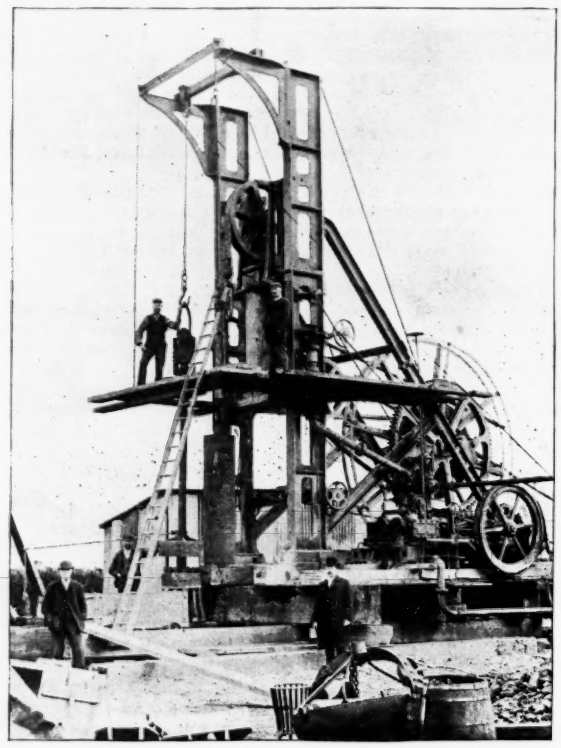
The vote of thanks to Mr. Rowan for his paper was carried by acclamation.

Referring to the remarks made by Mr. Wilson, Mr. J. F. Maclaren said he should like to add, in explanation, that he referred to Scotch anthracite coal. The tar coming from Scotch anthracite was not nearly so troublesome as that arising from gas coke, as it was liquid or semi-fluid, whereas the other was solid—more like tough india-rubber—and very readily caused the valves of a gas-engine to stick. The amount of tar present in the gas was very small, and it seemed to be carried over in a solid form as a mist. It could be removed from the gas by mechanical washing with water; but it seemed to escape the coke scrubbers used in their plant for purifying the gas. His firm had so far been unwilling to complicate the plant by adding mechanical washers; but they might possibly have to do so if they continued to use gas coke as a fuel.

LINCOLN CORPORATION WATER-WORKS.

The Boring Plant at Boultham.

In the "JOURNAL" for the 8th ult. (p. 910), we were able to give some interesting particulars with regard to the boring operations at present in progress at Boultham, for the purpose of securing an efficient water supply for the City of Lincoln. Mr. Percy Griffith, M.Inst.C.E., the Consulting Engineer to the Corporation,



has since kindly favoured us with a photogrraph of the boring plant; and we have pleasure in reproducing it. The boring (2 ft. 9 in. diameter) has now reached a depth of 310 feet; and when completed it will be the largest for water-works purposes ever driven. As mentioned in our previous article on the subject, the Contractors for the work are Messrs. Charles Chapman and Sons, Limited, of Salford.

THE DUNN EXTENSIBLE TRENCH BRACE.

A safer and more economical method of bracing the sides of trenches and other excavations for gas-mains, water-mains, sewers, &c., than the old-fashioned system of wooden struts cannot fail, on becoming known and proved, to obtain a good reception among contractors and engineers who have to deal with this particular class of work. For the Dunn extensible trench brace, safety, economy and other advantages are claimed. This is the device of a practical contractor; and it was first introduced in the United States some ten years ago. There it appears to have grown in considerable favour, and to be now used almost exclusively for bracing in trenching operations. But here we have not observed that it has obtained a wide adoption in the particular classes of work with which we are brought into contact. Probably this is due to the fact that the method and its advantages are not generally known in this country. However that may be, the experience in the United States is that the falling in of the sides of trenches (at times attended by fatalities) are now of rare occurrence. The brace is found especially valuable in trench work where quicksand is encountered, as it can be quickly tightened up, and the danger of the brace falling out of position is obviated. By reason of the powerful force exerted by the screw and lever nut in securing compression against the walls of the trench, the brace is rigidly and immovably fixed in position; and where the excavation is deep, this offers the advantage of placing boards or planking across the braces for scaffolding without danger of displacing them.

The brace is simple in construction. It consists of a length of 1½ inch gas-tubing, fitted at one end with an adjustable foot or socket-bearing plate, and a screw (1½ inches diameter, ordinary size), fitted with an adjustable foot, inserted in the tubing at the other end. The extension is secured by the travel of the lever nut working against the end of the tubing, as shown in fig. 1. The tubing is detachable, and the brace can be made to suit any width of trench, not within the compass of the screw extension, by fitting on tubing of the required length. The adjustable foot or socket-bearing plate is one of the main features, as, by its means, it is possible to obtain a firm and equal bearing for the brace at various angles. The weight of a 2-feet (closed) brace is 25 lbs.; and this can be safely extended to 32 inches. It is not considered practical to use this form of brace in trenches over 6 or 7 feet wide. In such cases, it is deemed advisable to employ a double thickness of tubing—2-inch over the 1½-inch—imparting additional stiffness or rigidity to the brace. A brace constructed of 2-inch tubing and 2-inch diameter screw is sometimes employed in trenches of this width.

FIG. 1.

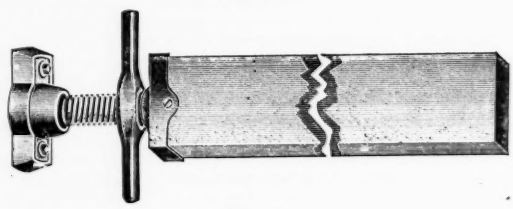


FIG. 2.

Fig. 2 shows the combination of the brace with timber; and in this form, it is also extensively employed. The timber is prepared by boring a hole in one end to admit the screw; and the end is then fitted with a washer plate or bearing cap. This style of brace possesses nearly all the advantages of the tubing pattern, and is brought into service in trenches of all widths, from 2 to 30 feet. The size of timbers usually employed varies between 4 in. by 4 in. and 12 in. by 12 in., according to the size of the excavation.

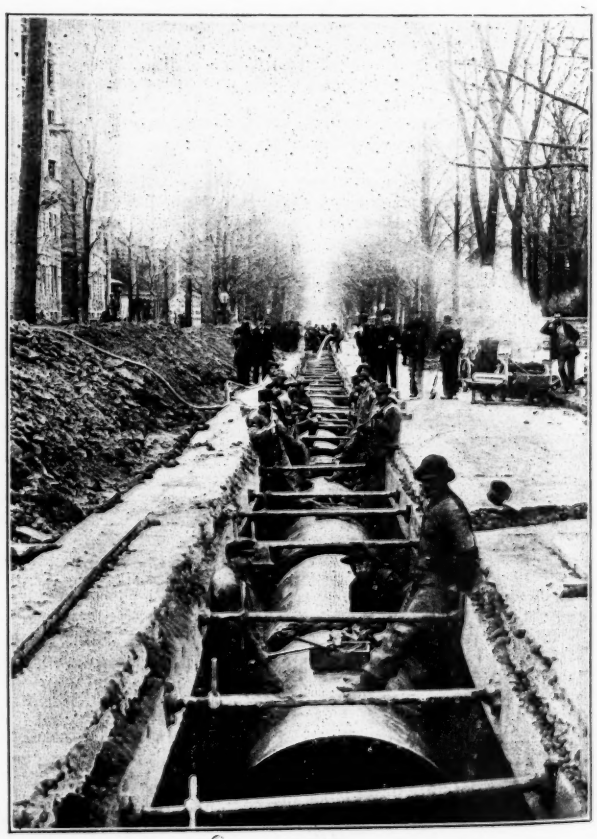


FIG. 3.—LAYING A 48-INCH WATER-MAIN AT BUFFALO, N.Y.

The accompanying view (fig. 3) is a reproduction of a photograph of the laying of a 48-inch water-supply main by the City Water Department of Buffalo, N.Y., the Engineer of which is Mr. Louis H. Knapp. The street shown is paved with asphalte; and owing to the friable nature of the soil, it was necessary to have

the top of the trench rigidly braced, to avoid further damage to the asphalte surface. As to the advantages of this system of bracing, the illustration conveys various ideas—for example, that the workmen are afforded a freedom of movement; that a brace can be readily removed to permit of pipes being lowered quickly into position; and that there must be a saving in time and material, which should soon cover the first cost of the braces. They are specially constructed to withstand the hard usage to which they are necessarily subjected; and, indeed, experience shows that there is little wear on them.

LOWERING GAS-FLAMES.

In the "JOURNAL" for April 8 last (p. 894), we noticed a little device which had been introduced under the name of the "Quin-Carty gas-peep," and the object of which, it was explained, was to provide ready means of enabling gas-flames to be lowered—more particularly in large establishments, such as factories and other business places—to a regulated point, so as not to extinguish them entirely, and yet not leave them at such a low point that they would be extinguished by accidental draughts, or otherwise. A reference to that article will show that we saw for this device a field of usefulness. From information which has since reached us, it appears that Messrs. Quin and Carty, in Glasgow, had been moving on the same lines as Mr. F. G. Bartlett, in Bristol; and apparently the last-named gentleman had anticipated the Glasgow inventors.

Mr. Bartlett's name is not unknown to many of our readers as the originator of several serviceable devices in connection with gas lighting, among others of what are known as "Auto-Igniters." This new invention of his, which, he informs us, anticipates the claims of Messrs. Quin and Carty, has reference to gas-taps, in which the plugs (and hence the gas ways) can be adjusted, so as to pass any desired quantity of gas. We have before us a copy of his patent specification, and also a specimen of the tap in question, and certainly there is a remarkable likeness between his production and that of Messrs. Quin and Carty. It will be remembered that the latter accomplished their object by simply drilling a hole obliquely through the boss of the gas-tap, to accommodate a fine screw, which, as we previously stated, can be adjusted to any degree across the path of the stop-peg of the tap, according to the size of the jet required to be left on. In the example then before us, by turning the tap to the left the stop-peg came in contact with the screw, and sufficient gas-way was left open for the supply of a jet. By turning the tap to the right, the stop-peg had a full sweep of the path in that direction; and so the flame could be extinguished by merely turning the tap that way.

Now all the difference between Mr. Bartlett's arrangement and this one is that, instead of drilling a hole through the boss of the tap for the pin, he fixes an arm or lug on to the body of the tap, and into this he inserts the adjustable screwed pin, against which the ordinary stop-peg of the tap comes, and by which the size of the jet which is left burning when the flame is not needed is determined. Exactly as in the other case, too, the stop-peg of the tap has a full sweep of its path to the right, and that therefore is the only direction in which the gas can be extinguished. It is not for us to express any definite opinion on the point as to priority; but there can be no question as to the similarity of the objects and methods of attaining them in these two instances. When the matter has been finally settled between the parties, then we shall be pleased to give some further information on the subject to our readers.

While referring to this matter, it may be mentioned that Mr. Bartlett has devised other methods of accomplishing the same thing—that is, of affording a passage through the gas-tap for a small stream of gas to the burner for a jet, and fixing the size of that jet when the full flame is not required. In another tap, he has sent for inspection, this is accomplished in perhaps a rather more complicated way than by the simple arrangement previously described; but, in this case, there is not so much chance of the adjusting-pin being interfered with by other persons than those whose duty it is to regulate the jets. In this case, too, the tap may be used for fixing the size of the lighting flame itself. Here the inventor fixes upon the top of the tap, and surrounding the spindle of the plug, a ring carrying a stud, which rests upon that portion of the body of the tap which is usually prepared for the travel of the stop-pin of the plug. Outside the ring carrying the stud is a cap which screws into the body of the tap and locks the ring and stud in any desired position, so that the ordinary pin can only travel the fixed distance in that direction. There are other features about the invention—such as a spring arrangement for holding the plug tightly in position, and for compensating for any wear that may take place—which need not be specially noticed, as the foregoing description suffices to show the manner in which the patentee's object is attained.

Benzol-Spirit Incandescent Lamp.—A Munich manufacturer has put on the market an incandescent lamp, which consumes a mixture of 60 per cent. of benzol and 40 per cent. of spirit (alcohol). It is said to give a light of about 300-candle power at a cost of 0·85d. per hour for fuel.

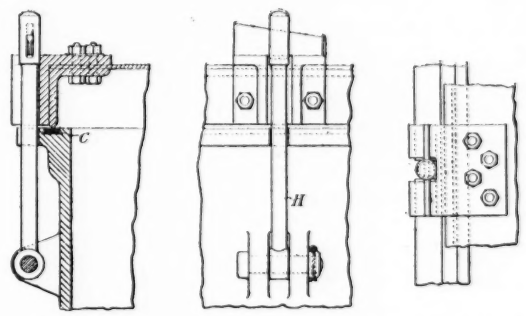
REGISTER OF PATENTS.

Making Incandescent Mantles.—Buhlmann, G., of Berlin. No. 12,413; June 18, 1901.

This invention relating to a process for manufacturing incandescent mantles has especially for its purpose to provide means by which the mantles are at the same time reduced to ashes and brought into proper shape, which two operations have to be effected separately in processes hitherto used. The proposal consists in placing the impregnated mantle around a wire webbing, the shape of which corresponds to the desired form, but is a little smaller than the diameter of the mantle to be manufactured. A mixture of gas and air is then led with a certain velocity into the interior of the wire mantle, and the mixture lighted on the outside of the mantle, so that a burning cover is formed around the wire webbing. This burning cover serves to reduce the mantle to ashes, and at the same time bring it into proper shape. The impregnated mantle is at first reduced to ashes with great rapidity, by means of the heat produced by the burning cover, and on being reduced to ashes shrinks together until it reaches the burning cover. In this position, the glowing proper of the mantle takes place, and the mantle adopts, without any manual help, the shape of the wire-webbing mantle.

Purifiers.—Smith-Rewse, H. S., and Coates, T., of Darlington No. 12,532; June 19, 1901.

This invention relates to a method of forming a tight joint between the cover and body of gas-purifiers, consisting in providing a packing of lead, white metal, or other similar alloy on one part, against which a bevelled edge of the other part is pressed. A groove or channel of dove-tail section is formed on the upper or horizontal flanges of the purifier side plates; and into this groove or channel the lead or other metal is introduced in a molten condition so as to fill the groove. The surface of the material is then levelled off; and the cover, with its V-shaped edge, is applied with sufficient pressure to close the joint—for instance, by means of bolts through the heads of which cotters are driven, the edge of the cover being forced into, and more or less embedded in, the jointing material, in order to form a gas-tight joint. Should, after a time, leakage take place at any point, the lead adjacent to the leaky point can be hammered or pressed to more or less fill the groove formed by the edge of the cover, so that when the cover is next applied the metal will again bed firmly against the V-shaped edge of the cover.



A sectional elevation of a portion of a gas-purifier having the improvements applied thereto is given; also a side view and plan.

C is the dove-tailed groove referred to, formed in the upper part of the horizontal flange of the purifier with the lead or alloy after cooling, levelled off, so that its upper surface is flush with the upper surface of the purifier-flange. On the cover being placed in position upon the purifier with the bevelled edges of the angle-iron flange resting upon the surface of the metal packing, the bolts H are turned up and passed into the slots in the brackets as shown, after which cotters are driven (as usual) through the slots in the heads of the bolts, so as to force the bevelled ends of the purifier-lid firmly into the soft metallic packing, and making a good joint.

Incandescence Gas-Mantles.—Crease, J. F., of Guildford. No. 451; Jan. 7, 1902.

This invention has for its object the giving to mantles increased strength and coherence by introducing into the cotton yarn or into the threads of vegetable fibre of which the combustible fabric or tissue which is to be steeped is manufactured, a fine asbestos yarn or a fine wire (of about 180 to 200 to the inch), made of either iron, tin, aluminium, copper, brass, nickel, silver, gold, platinum, or other suitable metal, or combination of these metals in the shape of any well-known alloy, which wire, if not of gold or platinum, may be previously protected from any chemical action which may be set up by the dissolved mineral salts or acids with which, during the process of manufacture, it may be brought into contact, by coating it with india rubber or gutta-percha dissolved in rectified spirits of naphtha or other solvent, or with dissolved luting, composed of beeswax and tallow, one part of the former to two of the latter, or with some other equally well-known protective composition. The asbestos yarn or the wire, so treated, in short lengths or in one continuous length, is passed in among the cotton fibres or filaments while they are being spun, either into yarn or afterwards into thread, and in such manner that the yarn or thread, so spun, has a single asbestos yarn or a single metallic wire or a series of short lengths of asbestos yarn or of metallic wire, end to end, running through its whole length.

If it is considered preferable to use continuous threads of cellulose (collodion) holding corresponding salts containing the oxides which subsequently constitute the incandescent body, and that these threads should have a core of either asbestos yarn or of metallic wire, it may

be done by passing the asbestos yarns, or the metallic wires to be used, into and through the capillary tubes during the process of manufacture, while the cellulose in solution is being forced through them. The asbestos yarns or the metallic wires emerging therefrom at the same time as the cellulose, will be coated with it; and the cellulose, so deposited, can be fixed by heat or by passing through water.

With threads so made up with asbestos yarn or metallic wire, and so spun or manufactured, there is formed, by means of weaving or knitting or otherwise, the tissue or fabric (preferably tubular), which is then steeped in the dissolved metallic salts employed, then dried off, shaped, and burnt in the usual manner in making an incandescence mantle.

Treating Ammoniacal Liquor.—Koppers, H., of Carnap, near Essen, Germany. No. 13,047; June 26, 1901.

This invention relates to means by which "the gas-water obtained in coke and gas works is used for the production of ammonia and sulphate of ammonia with continuous working."

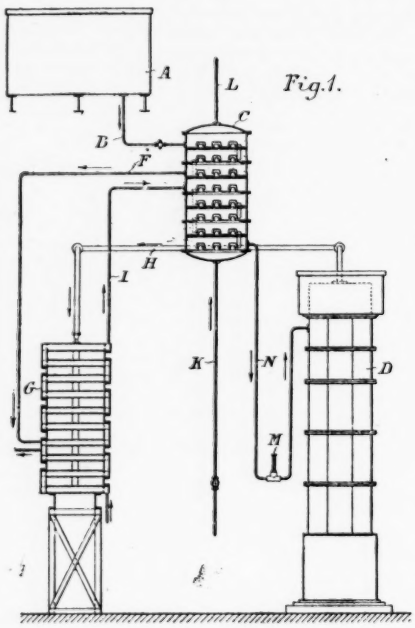


Fig. 1.

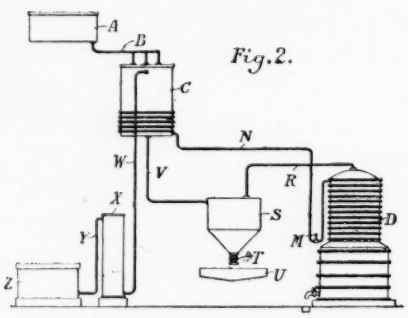
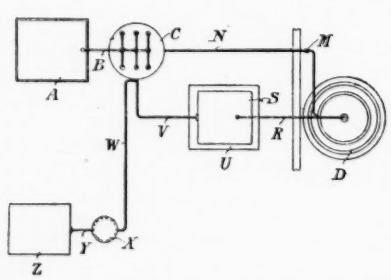


Fig. 2.



The patentee points out that, in the manufacture of ammonia with non-continuous working, where the gas-water is boiled in boilers with steam, the gases which escape before the ammonia—that is, particularly carbonic acid and sulphuretted hydrogen—are let off from the boilers in order to remove them until the first signs of escape of ammonia become apparent. On the gradual increase of temperature in the boilers, this stage of the operation can be easily ascertained. It is, however, different in the manufacture of ammonia with continuous working by means of distilling apparatus—known as separating apparatus or stills—in which the limit of temperature in the small quantities of water passing through the apparatus cannot be so exactly fixed. The result is either that no carbonic acid and sulphuretted hydrogen are given off, because the temperature is too low, or that on the temperature being too high too much ammonia escapes with the gases. The object of the present invention, therefore, is to prevent this from taking place, but nevertheless to continuously separate the carbonic acid or sulphuretted hydrogen, and, further, to utilize the heat of the vapours or exhaust fluids escaping from the distilling apparatus for preliminary warming of the liquor, and, finally, to obtain in the production of sulphate "a product as pure and odourless as possible."

Fig. 1 shows an arrangement for the production of ammonia in which the liquor is warmed by the gases escaping from the still; fig. 2 an arrangement for the production of sulphate of ammonia.

In fig. 1, the water to be used for the production of ammonia passes from a raised receptacle A through a pipe B, into the upper part of a column apparatus C, which works together with a separating apparatus or still D, arranged at a lower level, and with this forms (so to say) a distilling apparatus made in two parts. The liquor flows through the upper columns of the upper part of the distilling apparatus, and then, through a connecting-pipe F, into the lower part of a heater G, preferably formed by a column cooler, in which it cools the hot gases coming through the pipe H from the separating apparatus, and is itself warmed. The liquor warmed in this manner then passes through the pipe I into the lower columns of the upper part of the distilling apparatus; passes through the same; and in flowing downwards receives, through a pipe K, so much steam that the carbonic acid and sulphuretted hydrogen are set free, and rise together with the ammonia liberated.

In consequence of the cooling of the columns, which become colder at their upper part, the ammonia is retained therein, while the greater part of the carbonic acid and sulphuretted hydrogen escapes upwards through the pipe L. The liquor leaving the apparatus C at its lower end, and already prepared, is passed through a bent pipe N, provided with a thermometer M, into the upper part of the lower apparatus D, in order to be there further treated in the usual manner.

The arrangement may also be so made that the liquor is not preliminarily heated by the gases escaping from the distilling apparatus, but by the water flowing from, and driven out of, the latter.

In the arrangement for the manufacture of sulphate of ammonia illustrated by fig. 2, the vapour and gas mixture leaving the lower distilling apparatus D is conducted by a pipe R to a vessel S for saturating the sulphuric acid, in which vessel the sulphate of ammonia is formed. The latter is allowed to flow off through a valve T, and collected in a pan U or the like. The vapours of the saturating vessel (which is closed at the top), and the gases accompanying the vapours, rise and escape through a pipe V into the lower part of the upper distilling apparatus C, where they ascend, passing through colder and colder layers, by which they heat the liquor and become condensed at the same time. In consequence of the cooling taking place in the upper columns of the apparatus C, the ammonia libera ed is absorbed by the liquor, and the gases which have not been absorbed, as well as bodies containing tar, pass out at the upper end of the apparatus, and enter, by a pipe W, a coke scrubber X covered with sulphuric acid; and from there they come through a pipe Y into a purifier Z containing oxide of iron.

In this arrangement, both the quantity of heat which passes with the mixture of gas and vapour from the lower distilling apparatus D into the saturating vessel S and also the not inconsiderable formation heat of the sulphate of ammonia, which heat is transferred to the vapours, return into the upper part of the distilling apparatus, and are used for the preliminary heating of the gas-water.

By using this arrangement, a clean separation of the products into gases containing tar is said to be obtained, which gases "leave the apparatus at the top and are rendered injurious in the manner described and further separation into sulphate of ammonia, which is obtained as a pure odourless salt and also into exhaust water which does not contain any volatile constituents by reason of its boiling with steam and is consequently also odourless."

APPLICATIONS FOR LETTERS PATENT.

7398A.—Lambert, G. L., "Columns for gasholders." April 29.
9740.—Hamilton, J. H., "Internal combustion engines." April 28.
9749.—Ewart, J. W. & G. H., "Gas water-heaters." April 28.
9758.—Potter, W. G., "Argand burners." April 28.
9779.—Berthold, C. E. J., "Automatic gas-lighters." April 28.
9785.—Ransford, R. B., "Manufacture of gas." A communication from La Compagnie Universelle d'Acétylène. April 28.
9851.—Rose, P., "Self-generating gas-lamp." April 29.
9860.—Longridge, C. C., "Oil and gas engines." April 29.
9871.—Sugg, W. T., "Mantles for incandescent gas lighting." April 29.
9874.—Anderson, E. de N., "Gas-lighters." April 29.
9878.—Tibbs, H. H., "Mantle-supports for gas-burners." April 29.
9902.—Wise, W. L., "Manufacture of carbide cartridges." A communication from E. von Szalay. April 29.
9987.—Erich, O. H., "Incandescent gas-burners." April 30.
10,004.—Jeffery, W. H. & A. G., "Anti-vibrators for incandescent gas-burners." May 1.
10,034.—Honoré, R., "Production of oil gas." May 1.
10,055.—Godwin, A. H., Keil, F. A., and Dougall, J., "Manufacture of coal gas." May 1.
10,071.—Rateau, A. C. E., "Steam or gas turbines." May 1.
10,090.—Elsworth, E. R., "Gas-meters." May 1.
10,129.—Waller, G., "Rotatory pump." May 2.
10,134.—Puplett, S., "Condensers." May 2.
10,143.—Grouvelle, J., and Arquembourg, H., "Condensers." May 2.
10,176.—Cook, A. H., "Acetylene gas-generators." May 2.
10,267.—Bartlett, F. G., "Controlling and regulating devices for gas-burners." May 5.
10,358.—Thomas, J., and Podmore, A. E., "Incandescent gas-burners." May 5.
10,376.—Lanchester, F. W., "Gas and oil motor engines." May 6.
10,417.—Brookes, A. G., "Apparatus for consuming smoke or gases, or collecting and destroying products of combustion." A communication from J. A. Stearns. May 6.
10,422.—Josseaume, L. A. J. M., "Carburetting air." May 6.
10,426.—Robin, J. T., "Incandescent gas-mantles." May 6.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Flame Luminosity and "Cheap Gas."

SIR,—Mr. Jones should disclose his line of reasoning when he complains of my use of his subsequent paper to point the moral of my previous communications. To my mind, the fact that these communications antedated his paper by several weeks shows unreasonable persistence in the heresy I am refuting, and makes it all the more necessary that I should endeavour to rectify his latest (and public) plea for low-grade gas. Mr. Jones invited such a demonstration in your issue of April 29: "Will Mr. Glasgow formulate his proposition in detail; and then we shall see by what omissions or oversight he has arrived at the conclusions on which he ventures to base his condemnation."

In obedience to his wishes, I reviewed my arguments (*ante*, pp. 1194-5), based this time, to avoid side issues, upon figures furnished by Mr. Jones himself. In his last letter, however, Mr. Jones passes the "proposition" that he requested, and simply queries "that 16 candle gas could be made for 1s. per 1000 cubic feet. This is the sole question I asked. . . . Will he kindly answer it?"

Does Mr. Jones, then, concede my case, provided 16-candle power carburetted water gas can be made for 1s. per 1000 cubic feet? Personally, the connection seems a little obscure; but I would do much to convince Mr. Jones, and am asking myself what evidence he would accept as conclusive on this point. Perhaps his own. Therefore, notwithstanding his apparent sensitiveness on the subject, I will again utilize his recent paper through a quotation from my last communication—viz.: "If Mr. Jones will add $1\frac{3}{4}$ gallons more oil per 1000 to his carburetted water gas (at his 'reasonable average' price of $2\frac{3}{4}$d. per gallon), the cost of this gas will be increased, on his own basis of reckoning, to less than 13d. per 1000 cubic feet." To be exact, this increased cost, on Mr. Jones's own basis, will be 12·44d. per 1000 feet, giving a calorific value higher than his present 16-candle gas, and an illuminating power (with oxide purification only) of 18 candles.

The illuminating power is on my responsibility; the other figures must be satisfactory to Mr. Jones, since they are his own. Surely then he cannot be serious in questioning that *sixteen*-candle power carburetted water gas can be made for 12d. per 1000 cubic feet. Furthermore, if we substitute the actual present price of oil, on three years' contract, for the "reasonable average price" taken by Mr. Jones, the above cost is reduced to 10·5d. per 1000 cubic feet of *eighteen*-candle gas.

In reply to his final paragraph, I would remind Mr. Jones that I have advanced no "theories." I have simply weighed the arguments for low grade gas in the balance of established fact; and I have found these arguments wanting. I cannot, therefore, group my conclusions with his "theories," which he proposes to submit to the arbitrament of his future "investigations," any more than I can await his confirmation of the multiplication table. At the same time, I heartily and confidently trust that these investigations may bring us into accord.

A. G. GLASGOW.

May 15, 1902.

A Claimant for Honour—and Payment. The Incandescent Mantle Settlement.

SIR,—Your editorial comments and Mr. Livesey's letter compel me to take up the challenge. I will answer your leader and Mr. Livesey's letter seriatim.

I am not aware that the honour of the "notable feat" was "given;" Mr. Livesey took it. The "delicate and intricate negotiations" is a fitting designation of the work that I accomplished. Allow me to correct your assertion that my letter of May 3 is to set me on a "pedestal for the admiration of all beholders." I can see nothing that will justify "the meanest intellect" in arriving at any such conclusion. The object was to correct a misconception that Mr. Livesey's self-glorification had caused in the trade, and to enable a settlement to be arrived at which, but for the publication and mismangement, would and should have been completed at the same time as the other actions—a condition of affairs made possible by an understanding arrived at by the trade, and the courtesy and good-feeling of their Solicitor, and communicated by me to the Welsbach Board. I enclose copies of my letters to Mr. Livesey respecting my claim, and his reply to my second letter May 1; that of April 23 remaining unanswered.

I maintain—and I think the Solicitor for the mantle trade will bear me out—that it was entirely owing to the attitude he adopted for his clients, by agreeing that the settlement with the United Chemical and Voelker actions should take place, that it was possible. I think your remark as to reward for Mr. Livesey and Mr. Keith a proper one; and I would respectfully submit they should get it. They are no philanthropists; nor do they bear any affection for the Welsbach Company. They started to pull down the Welsbach patent solely on the ground that free trade would reduce the price of mantles; and they have attained their object, and will reap a substantial reward.

As to the "certain, not unimportant, representatives of the trade" acquiescence in your and Mr. Livesey's assertions, I readily understand, as they would be the very gentlemen who at a meeting held on March 15 not only thanked me for making the settlement possible, but agreed, if it took place, to reward me; and now that my position is disputed, they would willingly throw off the obligation if it were possible. I maintain that the settlement does not depend on the Guaranty and Voelker cases. The position is exactly the same now as far as the cases still alive are concerned; and all that has been done may yet be upset. I sincerely hope not; and my object is to prevent it. I think, as I write, I may say that it is in a fair way for adjustment. That the mantle trade did fall into line prior to April 29 is proved by a meeting of the litigants at their Solicitor's office on March 15; and, owing to this, the other actions were settled.

As to Mr. Livesey's letter. Mr. Livesey says it is clear that I mean to be troublesome—an admission clearly that I have right on my side. I have no desire to be troublesome; but I must insist on my right, as Mr. Livesey's assertion, if uncontradicted, will cause me considerable loss. I hold post-cards and letter, dated Feb. 15, March 3, 11, 16, and 23, and a telegram March 11. I don't think Mr. Livesey can produce more. If therefore he did not accept my services, why all this correspondence? I see no point in my seeing Mr. Livesey after the Guarantee Fund was started—a fund, by the way, which was to ruin the Welsbach patent. That they did not carry out this object is surely due to some other cause than Mr. Livesey's intervention, or why did he start such a fund? Now read the proposals I sent in my first communication. As these proposals are carried out in their entirety, I think it is "palpable to the meanest intellect" that it is a strange coincidence. The person who starts a fund to pull down the Welsbach patent has changed his opposition, and adopts in their entirety the proposals of the man whom he says had nothing to do with the settlement. Does it not strike one as strange that the fund which starts to ruin a business proposes and adopts the exact programme that the intermediary submits to all parties? I hold a letter of the Guaranty Company (signed by Mr. Schultz), inviting me to see the Solicitors; and I can produce a dozen or two others, if the above do not convince you.

Mr. Livesey's memory is a short one, as he complimented me on the position I had taken up, told me I deserved the trade's gratitude for my suggestions, and wished me success. He was "a man of peace;" and, considering the "uncertainty of law," he would endeavour to fall in line with others. The best proof I can give of the necessity of an intermediary is that neither side would make the advance, and both sides treated me with suspicion—thinking me an emissary from the enemy.

My task has been a very arduous one, and I don't think Mr. Williamson will endorse Mr. Livesey's remark that I did not act as intermediary. I have done very great service to both sides. I have caused litigation to be abandoned. The bar to trade being removed, the confidence of the public will be established, and a vast field is open for a steady trade, which as yet is but in its infancy. As regards the possibilities, compared with the Continent, we have not a tenth part developed. All parties will benefit enormously; and I maintain that I deserve fair remuneration for the conception and carrying out of the project, and Mr. Livesey should be the last man to oppose such. I am quite prepared to meet his Committee, and produce my letters. I have no fear as to the result. I have no wish to pose for honour, nor act as a philanthropist. Like Mr. Livesey, I had an object—viz., substantial profit. He has gained his, and should not begrudge me mine.

D. EDWARDS-RADCLYFFE.

May 16, 1902.

P.S.—At the outset, Mr. Livesey's project and mine were totally opposed. He wished to pull down a trade; I to conciliate and build up. I think the result speaks for itself. Ask whose proposals are adopted. Surely Mr. Livesey will not tell you that he started with the same object. If so, why this vast Guarantee Fund? I required none to carry out mine. If Mr. Livesey is a man of peace now, he is converted, as he started his fund as a man of war.—D. E.-R.

Sons of the Gas Industry.

SIR,—Your recent articles on this subject have caused a great deal of attention; but in what way do you intend that the "sons" should wake up? Mr. E. J. Wellens, of the Manchester Junior Association, gives, in this week's issue, an account of what his Association are doing for the junior members; but is this any good? I greatly doubt it. Will the reading of theoretical papers help any person to manage a gas-works, or will the holding of numerous certificates qualify a man for the taking up of a good position?

I think you will agree that this is not all that is necessary; but what is required is a sound practical training in every department connected with the gas industry, so that the engineer or manager will be able to know whether the work is done rightly or wrongly.

The Associations are very well as social affairs, and for the exchanging of experiences and opinions; but how many, if any, of the papers are of any practical use? What is required, in my opinion, is a good sound technical education, followed by two or three years' training on a works under a good engineer.

"MARMION."

May 15, 1902.

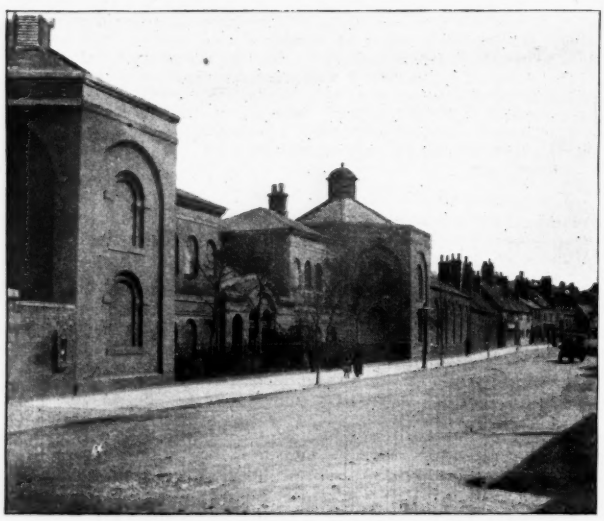
[Our correspondent's letter is welcome, because it shows that there is one in the gas industry who is content with the narrowness of things as they at present exist for the juniors of the industry, and a brief reply to the letter may be of service to him and others. We are afraid "Marmion" has not read, or has forgotten the tenour of, our first article which appeared on Feb. 18 (p. 398). If he will peruse it now, he will find there an answer to the greater part of his letter. The waking up part of the business, he will also see, by again reading the subsequent articles, refers to the general invitation to the sons of the industry to join their voices to ours and the Manchester Junior Association in urging upon the Gas Institute and the Institution of Gas Engineers to take a greater interest in the welfare of the young men of the industry than they have done hitherto. Our correspondent seems to occupy a position of supreme contentment. In this matter, he does not appear to see good in anything outside a sound technical education and two or three years' training on a works under a good engineer. He doubts that any benefit can come to members of the Manchester Junior Association from their meetings and visits to works, and he also appears to question the value of holding numerous certificates. Yet lower down he advises that a good sound technical education is one of the essentials for a gas engineer. That we fully admit; and our experience is that, as a general rule, certificates follow in the train of the "sound technical education." The "holding" of the certificates may not "qualify a man for the taking up of a good position;" but they go a good way towards showing that a man is

qualified, and has made intelligent and successful effort to qualify himself, for the taking up of such a position. His certificates prove him to be a good worker, and that is something. We agree absolutely that what is required by a young man who aspires for a professional position in the gas industry, is a good sound technical education, followed by a few years' training on a works under a good engineer. We go further and say that all that is wanted, and something beyond; and that something is the opportunity of being brought into early actual contact with work and the men who are carrying on that work outside the walls within which the coming engineer may find himself, as well as greater encouragement for self-advancement. No matter how good the engineer of a particular works may be, or however good the plant may be, all ideas and variations will not be found concentrated in one or the other.—ED. J.G.L.]

Gasholder Houses.

SIR,—It is too true that "familiarity breeds contempt;" and after seeing the two holder houses at the Warwick Gas-Works many times a day for many years, it at last came to my mind that to other men the view and description of these buildings might prove interesting. Of course, it is years since they were used for containing gasholders; but they are the same on the exterior as they were when in use.

These buildings (of which I send photographs), together with the gas-works in general, were built by Messrs. Barlow Bros., in 1822; and each contained a holder 30 feet in diameter by 12 feet high, and a tank of cast iron, built entirely above the ground level. So far as I can gather, there were no guides above the water-level; and one pulley



was fixed in the centre of each roof, between two principals, over which chains were carried from the crown of the holders to other pulleys at the side of the buildings, over which were suspended the balance-weights. An indicator was fixed to the outside of each house, showing the height at which the holder stood above the surface of the water; and it speaks well for the workmanship of 80 years ago that one of the indicators is still fixed to the wall and the figures—graduated in feet and inches—are now of a good colour and plain, and the wood appears sound.

On the erection of modern holders in 1854, the old ones were dismantled, and the buildings put to other uses.

WALTER T. TEW.

Warwick, May 9, 1902.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

LAST week the Committee rooms and lobbies were almost deserted; and, excepting the proceedings before the Joint Committee on the London Water Bill, there was only the further discussion of the water clauses of the Liverpool Corporation Bill, and a passing reference to the repealing of the Leamington Corporation Gas-Works purchase powers, which come within our purview.

The Retreat of the Leamington Corporation.

In last week's notes, reference was made to the clause in the Omnibus Bill of the Leamington Corporation, by which they seek release from their obligations in connection with the at one time projected purchase of the gas-works. We only allude to the matter again in order to place this novel clause on record, so that the full story of Leamington's eager desire to possess the gas undertaking and their equally ardent wish to retreat from the position in which they found themselves, may be hereafter found in our pages. This unique clause should certainly become famous in the history of gas-works purchase negotiations. Here it is: "Part X. of the Act of 1896, so much of Part XIII. of that Act as relates to the borrowing of money for the purchase of the undertaking of the Gas Company, and the second schedule to that Act are hereby repealed, and the writing served by the Corporation upon the Gas Company, in pursuance of the said Part X., requiring the Gas Company to sell their undertaking, property, rights, powers, and privileges to the Corporation, is hereby declared to be null and void." The part of the Bill in which this clause appeared was reached by Mr. Heywood Johnstone's Committee, who were considering the measure, on Monday last week. It was explained by Mr. Macmorran (Counsel for the Corporation) that, unfortunately for that body, at the time they gave the Company notice of their intention to acquire the works, under the powers of the Act of 1895, they thought they could borrow the money at the rate of 2¾ per cent, which would have made it possible for them to have carried on the works without having recourse to the rates. To their disappointment, however, they subsequently found that they would have to borrow at something like 3¾ to 3½ per cent.; and this would in all probability have entailed a considerable burden on the rates. They accordingly approached the Gas Company with a view to the withdrawal of the notice; and the Company consented on the condition that the Corporation obtained parliamentary sanction to the repeal of the clauses in the 1896 Act. The repealing clause was allowed by the Committee; and so the Corporation and the Company revert to the *status quo* of 1896. The time and money wasted over this attempt at municipalization at Leamington will not be soon forgotten by certain of the members of the Corporation. The Gas Company and their Engineer and Secretary (Mr. Thomas Berridge) may be congratulated, for they to-day occupy a position of which no other gas company in England can boast. It is this, that they are not likely to be worried from now by purchase proceedings during the present generation of town councillors. Other gas companies hardly know what a day or a week may bring forth.

A Disconcerting Decision for Liverpool.

Mistaking a decision with reference to one or two of the petitions against the water clauses of the Liverpool Corporation Bill for a complete declaration by Mr. Bill's Committee in favour of the proposal of the promotors to acquire a further 6000 acres of the Rivington drainage area for the protection of the water supply, we announced last week the victory of the Corporation. This was a little premature, for the discussion of the already much debated point was continued until Wednesday of the past week; and the final pronouncement of the Committee was not made before Thursday. During the greater part of the sittings devoted to the matter last week, the case of the opposition was in progress. Bolton and Mr. Lever fought hard and tenaciously for the retention of the 400-acre park which the latter has presented to the former, and for the estate which that generous donor has purchased for his own enjoyment. The line which the opposition took was to show that no harm could result to the Lower Rivington reservoir; that it is not even now above suspicion; that, owing to the great and growing population around, the water cannot continue to be used for any length of time, with safety, for domestic purposes; and that streams feeding the reservoir are already in a bad condition and exposed to pollution. The suggestion that Boltonians would so conduct themselves in the proposed park as to cause serious pollution of the water in the reservoir was resented as an insult. Such florid argument is all very well before a Committee; but it does not appeal to practical men. If the water in the Lower Rivington reservoir is as suggested, or if the streams are in the bad condition alleged by the opponents, is not the remedy to be found in placing the drainage area fully under the control of the Corporation, who are prepared to pay to the last penny the full value for it? Even omitting reference to decisions on minor petitions, the Committee's verdict on the main question cannot be put in briefer form than this: They considered protection for the water supply and reservoir of essential and primary importance, and must be secured. But, in their anxiety to facilitate, and not to prejudice, the generous proposals of Mr. Lever to provide a public park for Bolton—while finding the preamble proved so far as the acquisition by Liverpool of the lands required for the purpose were concerned, with the exception of Mr. Lever's own house and a certain small acreage of land which might be desirable to preserve the amenities of the place—the Committee felt that the Corporation should be required to devote the 400 acres as a public park as intended by Mr. Lever, but should not be required to pay for any land included in the proposed gift. The Committee trusted Mr. Lever would be willing to carry out his original intention, and would arrange with the Liverpool Corporation for the area being laid out according to his will. On their part, the Corporation, the Committee thought, should be authorized (in order to secure the reservoir and water-works and any communicating streams) to execute on the area such works as

they may consider necessary, or, in the event of objection by Mr. Lever, as may be determined by an arbitrator to be appointed by the Local Government Board. Beyond this, they considered the Liverpool Corporation should have power to expend money on water-works account for maintaining and managing the park, and to make by laws regulating the use of the park—such by-laws to be approved by Mr. Lever, or, in the event of his objection, by the Local Government Board. The decision is a curious and, to say the least, a cumbrous one. It appears to create the peculiar position of Bolton having a park given to them, which is to be maintained at the expense of the water consumers of Liverpool—in other words, the consumers will be paying for the upkeep of a place for the congregation of large crowds of people from other towns in the neighbourhood of one of their most important reservoirs. The decision is one which requires the serious consideration of the Liverpool Corporation; and before the Bill is out of Committee, we are almost sure to hear further of the matter.

High-Pressure Water Supply Irrespective of Altitude.

There was one other clause of the Bill which engaged the Committee for some little time. It sought to repeal a section of an Act of 1866, obtained for the protection of the Corporation in connection with the water supply in times of drought, but which clause has been interpreted by the Courts to compel the Corporation to supply water anywhere within their compulsory area at a high pressure irrespective of altitude. This refers to the litigation some time since connected with the supply to houses in the highest parts of Prescot, and reports upon which appeared in the "JOURNAL" at the time. A number of local bodies around Liverpool petitioned against the clause; but, as it was struck out by the Committee, it is unnecessary to enter into the contentions for or against it.

HOUSE OF LORDS.

The following further progress has been made with Bills down to the adjournment for the Whitsuntide holidays:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Chard Gas Bill, West Gloucestershire Water Bill.

Bills read a second time and committed: Belfast Corporation Bill, Birkenhead Corporation Bill, South Metropolitan Gas Bill.

Bill reported: Fareham Gas Bill.

Bills reported, with amendments: Devonport Corporation (Water) Bill, Leicester Corporation Bill, Limpsfield and Oxted Water Bill, Margate Corporation Water Bill, Omagh Urban District Gas Bill.

Bills read the third time and passed: Barking Gas Bill, Fareham Gas Bill, Weardale and Shildon District Water Bill.

The Coatbridge Gas Orders Confirmation Bill was presented, read the first time, deemed to have been read a second time, and reported.

The Gas and Water Orders Confirmation Bills and the Paisley Gas Provisional Order Confirmation Bill have been read a second time.

The Abercarn Urban District Gas Bill, Broadstairs Gas Bill, Commercial Gas Bill, and Newport Corporation Bill have been referred to a Select Committee, consisting of Lord Hawkesbury (Chairman), Viscount Hill, Lord Saltoun, Lord Digby, and Lord Hamilton of Dalzell: to meet on Wednesday, June 4.

HOUSE OF COMMONS.

The following further progress was made with Bills down to the adjournment for the Whitsuntide holidays:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Bristol Water Bill, Weardale and Shildon District Water Bill.

Lords Bills read a second time and committed: Abertillery Urban District Council Bill, Buxton Urban District Council Bill, Longwood Gas Bill, Newcastle and Gateshead Water Bill, Swindon United Gas Bill, West Hampshire Water Bill.

Lords Bills reported: Chigwell, Loughton, and Woodford Gas Bill, Deal and Walmer Gas Bill.

Bill reported, with amendments: Leamington Corporation Bill.

Bills read the third time and passed: Chard Gas Bill, Street Urban District Council Water Bill [Lords], West Gloucestershire Water Bill.

The Local Government (Gas) Provisional Order Bill has been read a second time, and committed.

The Rickmansworth Urban District Council and the Duke of Bedford have petitioned against the Rickmansworth Gas Bill.

JOINT PARLIAMENTARY COMMITTEE ON THE LONDON WATER BILL.

(*Lord* BALFOUR OF BURLEIGH, *Chairman.*)

Eleventh Day—Monday, May 12.

As briefly recorded last week, the Committee met to-day at one o'clock, and considered, in private, their decision with regard to the representation of the Metropolitan Boroughs and Urban District Councils on the Water Board. On the public being admitted,

The CHAIRMAN announced the decision of the Committee as follows: Adherence to the resolution come to on the 30th of April was lost on an equality of votes on division in the Committee. The precise form of Schedule III. will therefore remain for decision when the Committee have reached that point in the Bill, after going through clauses. The effect of that decision will probably be understood.

Mr. BALFOUR BROWNE (for the London County Council) said the effect was not quite understood. He believed there were ten members of the Committee (the whole number) present.

The CHAIRMAN: Yes. I said that adherence to the resolution was lost on an equality of votes. Those who understand the working of the rule of the House of Lords which governs Committees will know that in case of equality, if everybody is present, the effect would probably be that the form of the Bill will stand.

Mr. BALFOUR BROWNE: In your Lordship's House the non contents have it?

The CHAIRMAN: Yes.

Mr. BALFOUR BROWNE: I should have thought the original decision would stand.

The CHAIRMAN: No. The procedure has been arranged on precedents. I cannot produce them at present. I am informed, on advice given to me, that the precedents rule the other way. I think probably it will be inexpedient to argue it at the present moment. I purposely made the decision in guarded, and, I hope, accurate language. I do not think we shall be very long before we reach the schedule, and then perhaps it may be possible to have a full statement of the effect on a particular amendment which may be moved.

Mr. BALFOUR BROWNE said the only thing which suggested itself to his mind was that if the Committee were going to rescind a resolution which had been passed by the Committee, the proposition would be to rescind that resolution.

The CHAIRMAN: May I point out that the resolution is a resolution, and not an amendment on the Bill; no amendment having been made thereon. So far as the Bill at the moment stands, the question of what will happen will have to be decided on votes as we go through the lines and clauses.

Mr. BALFOUR BROWNE: Is it still open to be moved in this Committee that the constitution should be as you put it upon the 30th of April?

The CHAIRMAN: I should say that, with all their powers, Counsel would not be allowed to move an amendment.

Mr. BALFOUR BROWNE said in going through the Bill they had a right to bring up an amendment, and propose that one clause should be struck out or another added.

The CHAIRMAN: I shall have to ask the Committee to rule whether a particular amendment is competent or not; and if it is ruled competent, whether it is to be accepted.

A discussion as to procedure on the amendments suggested by the Water Companies, some of which were only now brought forward, then took place.

Mr. BALFOUR BROWNE asked leave to put in his amendments for the London County Council on the following day. The Council were anxious that they should not be pledged to discuss the amendments of the Water Companies at that stage, as they had only just been put into their hands. When Mr. Haward, the Comptroller of the Council, gave financial evidence with regard to the purchase clauses, it was stated that Mr. Haward practically represented the views of all the Local Authorities round London on the subject, or, at all events, that the other authorities were not going to put in any evidence, but would be quite prepared to leave the matter in the hands of the Council. That being so, he hoped the Committee would not attempt to deal with the clauses until the County Council had had an opportunity of considering them.

The CHAIRMAN: I think that position is entirely reasonable.

Mr. FITZGERALD suggested that an adjournment till the following morning would facilitate matters.

The CHAIRMAN asked that the Local Government Board, the London County Council, and the Water Companies, should endeavour to arrange the issues upon the somewhat complicated clauses and amendments in such a way as to give to the Committee on the following morning a succession of as clear issues as possible. Upon this understanding the Committee would adjourn.

Mr. LANKESTER said an amendment was to be brought forward by one of the Urban District Councils, in the event of their representation not being reintroduced into the Bill, providing for their taking over a supply of water for themselves. If they retained their representation in the Bill, they did not require this. Perhaps it would be desirable that he should show the Local Government Board the amendment that would be proposed, supposing the Committee were to adhere to the decision they had given excluding the Urban District Councils from representation.

Twelfth Day—Tuesday, May 13.

At the commencement of the proceedings this morning,

Mr. BALFOUR BROWNE, on behalf of the London County Council, put a question with regard to the exact effect of the decision of the Committee given on the previous day.

The CHAIRMAN said he would endeavour to re state the decision exactly as it would appear on the minutes. These would show that a motion was proposed, after hearing further evidence, to adhere to the decision of the 30th of April. That motion was lost on an equality of votes.

Mr. BALFOUR BROWNE asked if, under these circumstances, any member of the Committee should propose adherence to the resolution of the previous day, it would go.

The CHAIRMAN said the next form in which the matter would come up would be on a motion that a certain line of the schedule should be deleted. If there were an equality of votes, that line would not be deleted.

Mr. BALFOUR BROWNE said the *status quo* on Monday, as he understood, was that the resolution of the Committee of the 30th of April was standing.

The CHAIRMAN: Yes.

Mr. BALFOUR BROWNE said he should have thought it unnecessary to move adherence to it, because the Committee would be adhering to it until they departed from it.

The CHAIRMAN: That is what the minutes of the Committee will show. The point I wish the parties to understand is this—that when we come to the schedule of the Bill, it is possible that some member of the Committee may move that such and such a line or paragraph be deleted. If that motion is put, and there is an equality of votes, I am advised that the practice, according to the rule of the House of Lords, is that the line in the Bill stands.

Mr. BALFOUR BROWNE: The schedule was gone by the former resolution of the Committee, and you have to raise it up again.

The CHAIRMAN said the schedule was not gone, because there was no amendment made on the Bill. There was a general decision given; but the Bill had not in any sense been amended, and no amendment would be moved on the Bill until the Committee had been through it clause by clause.

Mr. BALFOUR BROWNE submitted that the resolution passed on the 30th of April was that a certain clause should be struck out of the schedule.

The CHAIRMAN: When we come to it; but we have not come to it.

Mr. BALFOUR BROWNE: Will it be competent for us to still argue that the schedule as it stands in the Bill as originally introduced may be altered? If it is to stand, as a law of the Medes and Persians, it is of no use for us to propose to alter it.

The CHAIRMAN: It will be competent, as we go through the schedule after going through clauses. But apart from the schedule, supposing an amendment is moved, and there is an equality of votes, everything will depend on the form in which the question is put. If the question is put that such and such a line be deleted, and there is an equality of votes, the old rule of presuming an equality of votes to mean a negative would apply, and that line would not be deleted. If an amendment were put forward to insert words, the old rule would tell in exactly the same way in the opposite direction, and the equality of votes would tell against the resolution. I am not arguing for or against, but stating the effect.

Mr. BALFOUR BROWNE said it seemed to be perfectly competent for any member of the Committee to move that the resolution come to on the previous day should stand. If then there were an equality of votes, that resolution would go.

The CHAIRMAN: I do not like to decide a question before it is absolutely necessary; but if I am put in that position, I should probably vote that the proper motion would be to move to delete a certain passage in the Bill.

Mr. BALFOUR BROWNE: I think you have got them there, my Lord.

The Clauses were then proceeded with. On Clause 2,

Mr. DANCKWERTS, on behalf of the Water Companies, said the Committee had decided that there should be an appointed day, at some period in the future, upon which date the transference of the undertakings to the Water Board should have effect. It was hoped by the Water Companies that some, if not all, of the arbitrations would take place before the appointed day; and in the natural course of things, some of them must so take place. Under the Bill, the undertakings, and also the liabilities of the various Companies in the way of debts and so forth, were to be transferred to the Water Board. If, therefore, the Court of Arbitration had to fix before the appointed day what would be the position on the appointed day, it would have to be prophetic; and this was a practical impossibility. In order to obviate difficulties of this sort, it had always been the practice of the Legislature, usually under the Lands Clauses Act, to fix some day, anterior to the date of the arbitration, at which the nature of the undertaking was ascertained, and what its liabilities were which had to be taken over by the purchasing body, and as from which day the undertaking, with its liabilities, should belong and attach to the purchasing body. The Water Companies therefore proposed that sub-clause 1 of clause 2 should read as follows:—

> Subject to the provisions of this Act, from and after the 31st day of December, 1904, the undertaking of each of the Metropolitan Water Companies shall, as from the fixed day (Jan. 1, 1903), as a going concern, be transferred to, and vested in, the Water Board, subject to any liabilities with respect to any debenture stock and any mortgage debt, and to any other debt, liability, or obligation of the Company then existing.

He had simply put in the date in order to show the Committee the effect of the amendment. This was a convenient amendment which would enable the arbitrations to be worked out with greater ease, and would at the same time carry out the object of the promoters in a businesslike way.

Mr. FREEMAN said the London County Council entirely agreed that there should be a fixed day, as suggested by the Water Companies; but the words "as a going concern" seemed to be objectionable, because they might be used as a basis for compensation. He understood that this was not the intention of the Companies; and, subject to that explanation being made, the Council agreed.

Mr. FITZGERALD said he could not agree to the amendment, which unnecessarily complicated the Bill. If the arbitration was held after the appointed day, no such question arose; and if before it, it was quite open to the Arbitrators, under clause 18 of the Bill, to say the calculation as to value should be made as from any fixed date. He objected to the use of the words "going concern," because, among other things, he did not know what they meant. He was not sure that he had ever seen them in a transfer Bill; but, at any rate, they were not commonly used. Where an unusual expression of this sort was employed, it was always made a matter of comment that it was meant to alter in some way the ordinary method of valuation, or something of that kind. But the whole amendment proposed was entirely unnecessary, and was tying the Arbitrators to fix a day, which course might or might not be convenient. According to the proposal, there would be a considerable period between the fixed day and the appointed day during which the undertaking would be carried on by the Water Company as trustees for the Water Board. That was not a very desirable state of things, but it might be necessary in some cases; and, if so, the Arbitrators could deal with it under the Bill as it stood.

The CHAIRMAN asked if the matter were not worth some consideration, seeing that it was agreed upon by two bodies whose interests did not always agree.

Mr. FITZGERALD: The two interests agree in one thing—that this Bill shall not become law.

Mr. FREEMAN objected very strongly to this statement. He was sure his learned friend was not instructed to make it.

Mr. DANCKWERTS, on behalf of the Water Companies, also protested against it.

Mr. FITZGERALD said he would amend it, and say that they were both opponents of the Bill; and it was not uncommon for opponents to combine if they saw an advantage in doing so.

Mr. FREEMAN said the Council were endeavouring to assist the Committee in getting the best Bill possible.

Mr. FITZGERALD, replying to a question by Lord Llandaff, said that under the Bill the value would in the ordinary way be taken as from the appointed day for the transfer, and no change in the affairs of a Company would affect that value. If, however, the Arbitrators chose, they could say: "Although the transfer takes place on the 1st of January next, we shall make our award on the basis as from the 30th of June last." In either case, a change of value would make no difference at all. As a matter of fact, six months could make no appreciable difference.

In answer to the Chairman, Mr. DANCKWERTS said that if the Committee objected to the words "as a going concern," the Water Companies would acquiesce in that decision. The Companies did not propose any cast-iron fixed date, but would leave it to the Court of Arbitration in each case to determine the particular vesting day, having regard to the making up of that Company's accounts.

Mr. FREEMAN said the County Council desired that the day should be fixed in the Bill. With regard to the different dates at which the accounts of the Companies were made up, the difficulty had been met in a previous Bill by a schedule being put in dealing with the matter in each case according to those dates.

The CHAIRMAN, having consulted the Committee, announced that the amendment was lost.

A draft amendment, proposed by the Local Government Board, to make clause 2 clearer, by the deletion of the words "subject to any liabilities," and the substitution therefor of the words "and there shall also be transferred from the Company to the Water Board all liabilities," &c., was agreed to without discussion.

On sub-section 2 of clause 2, referring to the issue of water stock,

Mr. FREEMAN said the London County Council proposed to delete the sub-section, and substitute the following:—

> The Water Board may issue to each Company, in consideration for the undertaking so transferred, such an amount of water stock payable under this Act as may be agreed upon between the Board and the Company as equivalent to the money value of the undertaking as determined by the Court of Arbitration.

This amendment, he said, had in view two things. In the first place, the County Council desired to prevent the newly-constituted Board from immediately coming to an agreement as to the price to be paid for the undertaking of any particular Water Company. It was true that the Council, in a previous Bill, had taken power to agree; but by the proposed constitution of the Water Board, they could have had no experience whatever of a water undertaking. Therefore, in the interests of the ratepayers, having established a very excellent tribunal, that tribunal should find what the amount to be paid should be. In the second place, the Council considered it undesirable that a Company should be forced to accept, and that the purchasing body should be forced to pay, in stock. It was much more desirable that there should be power for the Companies to require payment in cash.

Mr. PEMBER thought it might be said that the Water Companies were in agreement with the Local Government Board as to the form the sub-section should take. He believed he was right in saying that they were all reconciled to the taking of water stock as compensation for the transfer of their undertakings. The Companies had not been at one with the Board so long as the words stood in the clause, "shall issue to each Company, in consideration for the undertaking so transferred, such an amount of water stock," &c.; but he was told by Mr. Fitzgerald that he would agree to the following words: "The Water Board shall issue to each Company, as compensation for the transfer of their undertaking, such an amount of water stock created under the Act," &c. Therefore the Local Government Board and the Companies were substantially in favour of the sub-section altered in that way. The Companies did not wish the door to be shut to the possibility of an agreement being come to between the Water Board and any particular Company. If there were three or four arbitrations fought out which showed how various points of value would be dealt with in principle by the tribunal, surely it would be advisable to leave power for the Water Board to agree with any of the three or four remaining. It seemed to him ridiculous to shut the door to agreement, as suggested by the Council; and the Companies agreed to the Local Government Board's proposal in this regard.

The Committee decided to deliberate upon the matter, and the Committee-room was cleared. On the re-admission of the public,

The CHAIRMAN said: The Committee will accept that the price may be fixed by agreement, and will allow the substitution of the word "compensation" instead of "consideration." On the other point, the decision of the Committee is (and it shall be embodied in the clause) that payment may be made in cash, but with power to the Water Board and the Companies to agree to take payment in water stock, either in whole or in part.

Mr. FITZGERALD said the Local Government Board would bring up a clause to that effect on the following morning.

Mr. MORTON, on behalf of West Ham, urged that it should be given the standing of a Metropolitan Borough.

The application was not acceded to.

Clause 3, dealing with the effect of the transfer, was agreed to, there being no opposition.

On clause 4 ("Security for mortgage and other debts transferred to the Board"),

Mr. DANCKWERTS said it was doubtful whether the effect of sub-section 1 of clause 2, as amended, transferred to the Water Board the liability of the Companies in respect to rent-charges. He proposed the addition of the words, "and the Company shall no longer be liable with respect to the said debts, debenture stock, and rent charges."

Mr. FITZGERALD said there was no doubt at all about the matter. The words were the widest possible—"debt, liability, or obligation."

Mr. DANCKWERTS said a rent-charge did not necessarily create a debt or an obligation; it issued out of land.

Mr. FITZGERALD said if there was no liability to pay the rent-charge, there was no liability on the Company. Whatever the liability was, it was taken over by the Water Board.

The CHAIRMAN (after consultation): The Committee do not accept the amendment.

Mr. HUTCHINSON, speaking for the Lea Conservancy, pointed out that, under the Lea Conservancy Acts, the New River and East London Companies had vested in them the whole flow of the River Lea, with the exception of a certain quantity of water reserved for the purposes of navigation; and the consideration for vesting this water in these Companies, as their absolute property for the supply of the Metropolis, was the payment of £8000 a year to the Lea Conservancy. The view of the Conservators was that this £8000 a year stood somewhat in the same position as if it were an irredeemable debenture; and they asked that payment should be secured to them, either by the continuation of the annual payment by the Water Board, or (as proposed by a new clause to be brought up at a later stage), by capitalizing these annual payments as if they were part of the undertaking of one of the Water Companies. The Lea was a source of supply, and therefore part of the undertaking, of the two Companies named. It seemed only reasonable, therefore, that the obligations incurred by the Lea Conservancy to their debenture holders should be secured in one or other of the ways proposed. He introduced a verbal amendment to attain this end.

Mr. RAM said the Local Government Board had considered the amendment, and rejected it as needless; the matter being dealt with satisfactorily under the Bill. The only effect of the amendment would be to unnecessarily encumber the Bill with verbiage.

Mr. FITZGERALD said that if the Committee thought fit to put in the words, "debt, debenture stock, or rent-charges, or other annual payment," he would agree to it, to save time.

The words "or other annual payment" were inserted, and the clause as amended was agreed to.

On clause 5, dealing with the issue of stock,

Mr. F. THESIGER, on behalf of the London County Council, proposed the omission of this clause as unnecessary.

Mr. FITZGERALD said, in view of the fact that payment might now be asked for in cash, he would ask that the maximum time for payment for an undertaking after the award was given should be increased from three months, as it stood in the clause, to six.

This was conceded by the Committee, and the clause, as amended, was agreed to, as was also clause 6, dealing with the application of the sinking funds.

On clause 7, containing provisions as to certain boroughs and urban districts,

Mr. HUTCHINSON, for the Ilford and Barking Urban District Councils, proposed that their names should be inserted after Cheshunt. He said they desired to be placed in the same position as the other authorities mentioned in the clause, to be severed from the operation of the Act, and to be enabled to purchase the pipes, fittings, &c., of the East London Water Company and supply that part of their district.

Mr. FITZGERALD said the clause as it stood was intended to apply only to those urban districts which had been supplying water. Ilford and Barking did not come within this category. The matter could not be raised on a Transfer Bill, but should be brought up, if at all, upon a Bill promoted by the Urban District Councils named.

The CHAIRMAN said the Committee were against dealing with Ilford and Barking in the Bill.

Clause 7 was then agreed to.

Thirteenth Day.—Wednesday, May 14.

On the re-assembling of the Committee this morning,

Mr. FITZGERALD brought up a clause, in lieu of clause 2, to give effect to the decision of the Committee on the previous day. It was as follows:—

(1) Subject to the provisions of this Act, as from the appointed day the undertaking of each of the Metropolitan Water Companies shall be transferred to, and shall vest in, the Water Board. There shall also be transferred from the Company to the Water Board all liabilities in respect of any debenture stock or mortgage debt of the Company, and all other debts, liabilities, and obligations of the Company then existing.

(2) The Water Board shall pay to each Company, as compensation for the transfer of their undertaking, such a sum as may be agreed upon between the Board and the Company, or in default of agreement as may be determined by Arbitration under this Act; but the sum so payable may, if the Water Board and the Company so agree, be discharged wholly or partly in water stock. An agreement for the purpose of this section shall not be made except in pursuance of a resolution of an absolute majority of the whole number of the Water Board after ten clear days' notice in writing of the meeting and of the intention to propose the resolution has been given to every member of the Board.

On clause 8, dealing with the power of severance of certain rural districts, and the supply of them in bulk,

Mr. THESIGER said he would call evidence on behalf of the London County Council.

Mr. *E. J. Harper*, Statistical Officer and head of the Local Government and Statistical Department of the Council, said that up to the present the Committee had only allowed severance in the case of local authorities giving a supply of their own. If all the rural districts exercised their option under the Bill to go outside the area of the Water Board, the limits of supply would be reduced by 192 square miles. These bodies had an option which they would exercise for their own advantage; and no time was fixed at which that option should terminate. The County Council felt that the Water Board should know definitely the area over which they were going to exercise authority.

Mr. FITZGERALD, replying to a question by the Chairman, said the difficulty about requiring the option to be exercised within a definite time was that the greater portion of these rural areas were not supplied at all at present. Whether they would want a supply would depend upon the growth of the population.

Lord R. CECIL (for Hertfordshire) supported the proposal of the Bill that the option should be given. In reply to Lord Llandaff, he said that the question of a supply in bulk, as a matter of engineering, had been gone into, and there was no difficulty whatever. It was already being done in the case of Cheshunt.

It was stated that all the outside authorities interested were in agreement with the provisions of the Bill in this regard.

The CHAIRMAN said the Committee were in favour of the Bill as it stood.

Mr. THESIGER then proposed an amendment on behalf of the London County Council which had for its object the deletion from the Bill of the clause giving power to the rural districts outside the area to demand a supply of water from the Board. He pointed out that such supply was obligatory upon the Board under the Bill, and that at some future time this might be very detrimental to the interests of London.

Mr. FITZGERALD, in reply, stated that the quantity of water so supplied, and the price, were matters for arbitration. This would be sufficient protection for London.

The amendment was rejected.

Mr. HOLLAND, on behalf of the Barnet District Gas and Water Company, brought up an amendment to the clause, the principal object of which was to provide that, as the Company had been given a district of their own, no supply should be furnished by the Board to a local authority within that area.

The Committee declined to accept the proviso.

Mr. HUTCHINSON, representing Finchley, asked for words to be inserted preventing the Finchley Urban District Council from being prejudiced by the power of the Barnet Company to take water from the Board.

The CHAIRMAN: The Committee are unanimous against the proposal.

Lord LLANDAFF: The matter is not relevant to the Bill.

Clause 8, as amended, was agreed to.

On clause 9, making provision for the substitution of water stock for irredeemable debenture stock,

Mr. BAGGALLAY, for the Water Companies, said there was a question of principle underlying the form of this clause. The first sub section proposed that within two years from the appointed day all irredeemable debenture stock should be extinguished, and the Water Board should issue to the holders thereof, in substitution, the amount of water stock to which they were severally entitled under the section. The amount of water stock was to be "such an amount as is sufficient to produce the same sum by way of income as the debenture stock in substitution for which it is issued." The principle underlying this was the compulsory conversion of an irredeemable into a redeemable debenture stock, and an arbitrary assessment of the equivalent value; this being what it would produce in the way of revenue, regardless of what the capital value might be. The principle proposed by the London County Council's clause was shown by the second paragraph: "The Water Board may, if they think fit, at any time not later than two years after the award, and after giving three months' notice, redeem and extinguish any debenture stock of such Company, upon paying to the holders thereof such a price as shall, failing agreement, be determined by the arbitrators to have been the fair average value thereof during the year preceding the 1st day of November, 1901, together with such further sum as the arbitrators may award to meet the cost of re-investing such money." The principle of that was equally a compulsory purchase; but the Council proposed that it should be converted into cash, which should be valued upon an arbitrary period—that period being perhaps the worst for ascertaining the value of gilt-edged securities which had occurred for a long time. Whichever of those two proposals was taken, a dangerous principle was involved. Lord Llandaff's Commission had reported as follows: "There appears to be no way of dealing with the stock (irredeemable debentures) except by the purchaser taking it over from the Companies;" and, later on, "We think irredeemable debenture stock should not be converted into redeemable debenture stock." This expressed the true principle, that such stock should not be made redeemable except with the consent of the holder. If the proposal of the Bill were adopted, he urged that public confidence would be shaken. He suggested that paragraph 1, with the amendments, should read as follows:—

The Board may at any time after the appointed day issue to the holder of any irredeemable debenture stock of any of the Water Companies who may be willing to surrender his stock, in substitution thereof and in extinguishment thereof, water stock created under this Act.

If the water stock were a good one, no doubt a large number of the debenture stock holders would take it; but his point was that the obligation should not be forced upon them to take it against their will. If his proposed amendment were carried, the rest of the clause would go.

Mr THESIGER said the contention of the County Council was that both irredeemable and redeemable stock should be treated in the same way—viz., the value of both should be settled by agreement or by arbitration. Mr. Baggallay had insinuated that the capital value of the stock given in lieu of the irredeemable stock would be somewhat lower; but it was apparent from Mr. Haward's evidence, which had not been contradicted in any way, that the capital value would be considerably higher.

Mr. FITZGERALD, in reply, said that the debenture stock holders were entitled to a certain income, and that income was preserved to them. If they could be paid off the day afterwards, or even ten years afterwards, he would agree that their position might be materially altered; but the proposition of the Local Government Board was that the water stock to be issued to the irredeemable debenture stock holders should not only produce the same income as they were now receiving, but should not be redeemable for sixty years. The water stock which would be issued to the debenture stock holders would be a stock of £5,000,000 or £6,000,000, would be readily marketable, and would certainly command a higher price than the stock now held.

Mr. THESIGER said that the County Council were quite willing to alter the date at which the value was to be taken, if the Committee thought it desirable.

The room was then cleared. On the re-admission of the public,

The CHAIRMAN said: The Committee affirm, in principle, clause 9 of the Bill (converting irredeemable into redeemable debenture stock to give the same income). They hold over any amendment in the paper not inconsistent with that for further discussion.

Mr. *Haward*, Comptroller to the London County Council, was then called in support of the Council's view that if the water stock were given, it should be redeemable in thirty years, as against the sixty years proposed by the Bill.

Mr. FREEMAN: By the decision of the Committee, the proprietors receive the same income in the new stock?

Witness: Yes; with a better security.

In your opinion, is that also a reason why there should be the benefit to the purchasing body of redeeming in a shorter period?—Yes.

The CHAIRMAN, to Mr. Danckwerts: What is your proposal for the Water Companies?

Mr. DANCKWERTS: Eighty years.

Counsel then addressed the Committee upon the proposed duration of the stock. He urged that many of the debentures were held in trust for young children, and that the stock should at least be secured to last over their lifetime.

Mr. RAM said it was after careful investigation, and after taking the opinion of experts in the matter, that the Local Government Board had chosen sixty years.

The CHAIRMAN, after consultation, said the Committee accepted the sixty years.

Two verbal amendments in clause 9 proposed by the Companies—one the alteration of the word "may" to "shall," and the other dealing with the production of certificates, altering the words "have considered sufficient," to "be reasonably required"—were agreed to.

Clause 9, as amended, was agreed to; and clause 10, dealing with the redeemable debenture stock and mortgage debts, was passed without opposition.

The financial provisions of the Bill were then considered. On clause 11 ("Expenses of the Board"),

Mr. FREEMAN said the London County Council desired that there should be uniformity of rating throughout the water area; and he brought up an amendment to that effect.

The CHAIRMAN: Am I right in thinking that there are two main questions to be decided on this clause—first, the apportionment of any deficit which may take place, and, secondly, whether there is to be any alteration in the law of charges for the purpose of finding out whether there is a deficit or not?

Mr. FREEMAN: Yes; and for the purpose, if possible, of making an equal basis of valuation, which does not exist at the present time.

Mr. *Harper*, recalled, said, in answer to Mr. THESIGER, that the Royal Commission on Local Taxation, presided over by Lord Balfour of Burleigh, had recently reported on the matter of rating. He then read certain extracts from the report, as follows:—

> There is no guarantee that Union Assessment Committees are fairly representative of all interests within their area; and it has been alleged that particular classes of property are sometimes over-valued or under-valued according to the interest which the members of an assessment authority may have in bringing about such a result. . . . As between parishes and parishes, unions and unions, counties and counties, there is no uniformity in the system adopted for valuation. Secondly, there is frequently inequality in the valuation of properties of the same character in different districts, and also in the relative amount of rates paid by occupiers of the different parishes to the same Poor Law Union. Indeed, under the present system of levying county and union rates, it is to the interest of assessment committees to have a low valuation; and this result would be obtained by undervaluing, by neglecting to re-value, or by making large deductions from the gross value of properties.

The Commission recommended:—

> That there should be only one valuation or polity in each county, and that the valuation list of that authority should be the basis on which rates and taxes for all purposes should be raised.

Witness went on to say that under the Bill there would be 361 different authorities for rate-collecting purposes within the water area; and under those circumstances, it was impossible to obtain uniformity. The chief reason why there would be unfairness to London was that there were two different bases of valuation under two different statutes. The Valuation (Metropolis) Act, 1869, applied in London only, and made provision for a periodical re-valuation every five years of all the property in the county. There was no corresponding provision in the Act which governed the assessment of the properties outside the Metropolis. The consequence was that, while the growth of value as it arose in the county of London was almost always recognized and incorporated in the valuation list, it was not so recognized in the valuation lists outside. As a result, broadly speaking, the assessment was on a distinctly lower level outside the county of London than it was inside. Another reason was that London possessed a greater proportionate share of the property not supplied with water. The County Council proposed that the Water Board should be the rating authority within its area for water purposes only.

Counsel on behalf of the Middlesex and Essex County Councils stated that these bodies were in agreement with the proposals of the Bill in this regard, and against the proposal of the London County Council.

Mr. RAM said the Local Government Board thought that the suggested evils could not be remedied without causing still greater evils; and there would be the greatest difficulty in creating a new rating authority, as well as expense. Another point was that many of the ratepayers in the outside districts did not take the water at all. The matter could, of course, only arise if there were a deficiency; and it was anticipated that long before a deficiency could possibly arise, necessitating a rate-in-aid, there would be a new Valuation Bill, which would deal with all these matters by proper machinery.

The CHAIRMAN: I hope there may; but I think you are sanguine in that respect. I know the immense difficulties which surround this question; and I am willing to hold it over, because we shall, before concluding this clause, have some other questions as to the probability of a deficiency, and how it can be avoided and so on. I express no opinion on the merits; but I am rather inclined to exhaust in general discussion and evidence what is to be said on this clause before we come to deal with individual amendments.

Mr. *Shaw*, Clerk to the Guardians and Assessment Committee of the Edmonton Union, was then examined by Mr. RAM with regard to the cost of valuation. He said the public companies in Edmonton were re-valued once in five years; the other properties were valued by the Overseers. The cost of the valuation of the public companies was from £1800 to £2000. The area comprised nine parishes, with a rateable value of £1,500,000.

Before the Committee rose,

Mr. PEMBER alluded to the statement made by Mr. Fitzgerald the previous day, which, he said, implied that the Water Companies were in league with the County Council to wreck the Bill. The Chairmen of the East London and the West Middlesex Companies were in attendance, and felt aggrieved at the statement made. The charge was as false as any charge could possibly be; and it was only fair that it should either be re affirmed or disavowed.

The CHAIRMAN said the advice which he should be inclined to give the Committee, which he hoped would be satisfactory to the Companies, was that the Committee accepted the assurance given. If Mr. Pember wished to put the gentlemen named into the box, he would not vote against it; but he thought such a course was altogether unnecessary.

Mr. PEMBER said he thought there should be an apology.

The CHAIRMAN: I am inclined to close the incident at the moment. Perhaps, as Mr. Fitzgerald is out of the room, Mr. Ram will call his attention to the matter; and I have no doubt we shall hear something about it to-morrow morning.

Fourteenth Day—Thursday, May 15.

At the outset of the proceedings to-day,

Mr. FITZGERALD said that his attention had been drawn to a statement made yesterday while he was out of the room. Mr. Pember said that Colonel Lockwood and Mr. Boulnois, the Chairmen of the East London and West Middlesex Companies, were aggrieved at the statement which he (Mr. Fitzgerald) had made that—"the Water Companies we e in a sort of league with the London County Council to wreck the Bill." He thought the least Mr. Pember could have done was to quote the words correctly. What he had said was: "The two interests that do not always agree are agreed on one thing—viz., that this Bill shall not become law." There was an offensive ring about Mr. Pember's version; and it was capable at any rate of the interpretation that there was a suggestion of some impropriety, whereas there was no such suggestion in the words actually used. It was merely an inference which he had drawn. He at once accepted the statement made by the other side that it was an erroneous inference. He felt that what he ought to have said was: The two interests are agreed on one thing—viz., that the Bill shall become law. He would accept in the future discussions on the Bill that benevolent attitude on the part of the County Council and the Water Companies. He hoped that Colonel Lockwood and Mr. Boulnois would accept his assurance that nothing was further from his mind than to cast any reflection upon them or any of the Directors of the Water Companies.

Mr. BALFOUR BROWNE: Does my friend leave the imputation upon my clients?

Mr. FITZGERALD: I have never cast an imputation upon anyone.

Mr. BALFOUR BROWNE: My friend says these two bodies are interested that this Bill should become law. I cannot quite accept that.

The CHAIRMAN: We will leave it that you and the Companies will do all in your power to make it a good Bill; and if it is a good Bill, you would like it to pass.

Mr. BLENNERHASSETT then read the new clause 11 proposed by the Westminster Corporation as follows: "The Water Board shall exercise all the rights and powers of charging water-rates transferred from the Metropolitan Water Companies to the Water Board by this Act before issuing any precepts under the provisions of section 11 of this Act." He pointed out that under clause 11 of the Bill any deficiency in the water fund was to be apportioned in proportion to the rateable value, the Water Board was to issue precepts, and the amount was to be raised, in Westminster, out of the general rate. There was nothing whatever to compel the Water Board to maintain the existing charges; and they would have absolute power to reduce or to equalize the charges as they pleased. By such equalization, the burden of a vast deficiency might have to be borne by the ratepayers in certain parts of London. It was to protect themselves against this injustice that the Corporation of Westminster asked for the insertion of the above new clause. Westminster was part of an area supplied by four Water Companies—viz., the Chelsea, the Grand Junction, the New River, and the West Middlesex. The rest of the Metropolis was supplied by the East London, the Southwark and Vauxhall, the Kent, and the Lambeth Companies. In area No. 1 (that including Westminster), the water-rates were apparently the lowest in the whole of London. Speaking generally, they were 4 per cent. on the rateable value of houses rated up to £300 a year, and 3 per cent. on houses rated above £300. In area No. 2, the water-rates were considerably higher. The East London Company's rates were 5 per cent., the Southwark and Vauxhall 5 per cent., the Kent Company 6 per cent., and the Lambeth Company (where there were exceptional circumstances) 7 per cent. Another pertinent fact was that the four Companies in area No. 1 paid a considerably higher dividend than those supplying area No. 2; the average of the former being 10½ per cent., as against 8¼ per cent. of the latter. As a fact, the rates charged in area No. 1 were more generous to the Companies than the higher rates charged in area No. 2. The actual burden on the ratepayers was far higher in area No. 1; and in the City of Westminster the actual amount paid for water was by far the highest in the Metropolis. This resulted from the high rateable value of part of Westminster; the houses being rated as much as, and even more than, six times higher than those in other parts of London. In area No. 1, the rateable value of the houses supplied was £21,189,000; while in area No. 2 it was only £12,218,000. In Westminster, it was £3,626,000. The rateable value per head amounted to £8 15s. in No. 1, as against £3 13s. in No. 2; and the payments thereon were 7s. per head (4 per cent. on £8 15s.), as against 4s. 4½d. per head (6 per cent. on £3 13s) in area No. 2. In Westminster, it amounted to 15s. per head, as compared with the 4s. 4½d. The average daily quantity of water provided in 1895 (the last figures accessible) was 82,814,000 gallons in No. 1, and 122,171,000 gallons in No. 2, for which the charges were: No 1, £1,153,000; No. 2, £964,8co. This showed that area No. 1 paid £188,000 more, and received daily nearly 40 million gallons less, than area No. 2.

In answer to a member of the Committee, Mr. BLENNERHASSETT said that the fact that in area No. 2 a large quantity was supplied for manufacturing purposes, which was at a lower rate, might enter into

the calculations to a very small degree, but would not materially affect the figures given. The real cause of the discrepancy was the immensely higher assessment of the houses in area No. 1. The payment for water for domestic purposes in No. 1, per 1000 gallons supplied, was £13 18s. 8d.; in No. 2 it was only £7 18s. The question of Westminster did not only apply to rich people, there were a large number of poor people in the district. If the Water Board were not compelled to charge the maximum amount allowed before raising the rate, the deficiency would fall upon those places which now bore the heavier burden to the extent of two-thirds. Roughly, one-ninth would be borne by Westminster. They had no objection to the lowering of the charges for water if the income met the expenditure. The amendment proposed by the Local Government Board was as follows: "The Water Board shall not, until otherwise authorized by Parliament, reduce the rates charged for the supply of water below those in force during the quarter ending the 24th of June, 1902." This met the point to some extent; but he submitted that his clause was a better way of meeting the difficulty.

Mr. *Woodhouse*, Comptroller to the Westminster Corporation, substantiated the figures quoted by Counsel in his speech, and bore out his opening statement.

In cross-examination by Mr. RAM, he said that the only objection to the Local Government Board's amendment was that it would leave Westminster with the inference against them when the matter was next brought before Parliament.

Mr. *Bingham*, Chairman of the Westminster Poor Law Union, gave corroborative evidence. He said the equalization of charges would greatly increase the rates in Westminster to the advantage of the outer districts.

The CHAIRMAN said no decision could be given with regard to the amendment proposed by Westminster until the other amendments to the clause had been heard.

Mr. THESIGER then brought forward the County Council's proposal, as follows: "Any sum required to meet any deficiency in the water fund, whether for satisfying past or future liabilities in any financial year, shall be apportioned in the City of London and the parishes in the County of London, and in the boroughs and urban and rural districts outside London within the limits of supply, in proportion to the rateable value appearing in the valuation lists." He said there were two intelligible methods of levying a deficiency rate—either apportioning it and levying it on the rateable value of the whole area, or apportioning and levying it on the premises supplied with water. The proposal of the Bill was a sort of amalgam between the two, because, in the first place, they apportioned it according to the rateable value of the premises supplied with water, and then subsequently the rate would have to be levied by precept from the Water Board to the local authorities, according to sub-section 4, out of the local rate. The County Council contended that if a deficiency rate were to be raised at all, it should be raised, apportioned, and levied, on the whole area irrespective of supply.

Mr. BAGGALLAY, on behalf of the County of Middlesex, agreed with what Mr. Thesiger had said with regard to sub-section 2. With reference to whether the Water Board should be compelled to charge in full before any charge fell upon the rate-in-aid, he was entirely in accord with the views expressed by Mr. Blennerhassett on behalf of the City of Westminster. With regard to the new sub-section proposed yesterday by the London County Council—viz.: "For the purpose of apportioning any deficiency in the water fund, the Water Board shall have, in respect to all parishes liable to contribute to such deficiency, the powers conferred upon county authorities by sections 1 to 20 inclusive of the County Rates Act, 1852," the County of Middlesex thought it very undesirable to create a new valuation authority. If it should be found necessary hereafter to have some new body dealing with the matter of valuation, it should be dealt with by subsequent legislation.

Mr. RAM then moved the amendment of the Local Government Board—viz.: "The Water Board shall not, until otherwise authorized by Parliament, reduce the rates charged for the supply of water below those in force during the quarter ending the 24th of June, 1902." He urged that that was the true method of dealing with the matter in the absence of any method for dealing afresh with the whole subject.

Mr. BLENNERHASSETT, in reply to a point raised by Mr. Ram, amended his proposed clause by adding the following words: "As fully as such rights and powers have been exercised by the Metropolitan Water Companies during the quarter ending the 24th of June, 1902."

The CHAIRMAN: As altered, the only difference between you and the Local Government Board is that under their proposal the consent of Parliament would be required?

Mr. BLENNERHASSETT said that under the Local Government Board's Amendment, it would not be competent to reduce the charges without going to Parliament. The Corporation of Westminster proposed that directly there was a surplus, there should be an automatic reduction of rates.

Mr. RAM, in answer to the Chairman, said the Board would not insist upon the application to Parliament, which had been inserted to meet opposition. He added that it had been thought better to leave out the rural districts, because they had no direct representation. The County Councils, of course, represented them to a certain extent.

The room was then cleared. On the re-admission of the public,

The CHAIRMAN said: The Committee reject the proposal to have a special valuation basis for the outside areas. They will accept the clause proposed by the Westminster Corporation as amended by them; leaving over the point whether it is to go in as a new clause or as an amendment to clause 11 for subsequent adjustment. Before deciding the question whether the rate to supply a possible deficiency is to be spread over the areas concerned upon the plan of the Bill or upon the plan which would be brought into effect by the amendment of the London County Council, the Committee would like to know whether it would not be possible to supply them with a table to show what the effect of the amendment of the County Council will be.

Mr. THESIGER said that such a table would be supplied at the next meeting of the Committee.

The CHAIRMAN (continuing) said that the question of whether the rural districts should be included must clearly stand over until the table had been examined.

Mr. BALFOUR BROWNE, on behalf of the Railway Companies, proposed the following proviso: "Provided always that railways situate in any parish not within the City of London or the Administrative County of London, constructed under the powers of any Act of Parliament for public conveyance, shall be assessed in respect of any rates to be levied or made under, or for the purposes of this, Act in the proportion of one-fourth part only of such net annual value thereof." He said that this would maintain the Railways in their present position. The same object might be met in some districts by altering the words in sub-section *C* of clause 11 from "poor-rate" to "general district rate;" but in a great number of districts it would not have this effect.

An application to the same effect was made on behalf of the Canal Companies.

Mr. RAM said the matter would be left in the hands of the Committee to decide; but if the concession were given, it should be done by the rate being levied on the district as part of the general district rate outside London. That would relieve all the other Companies which were relieved as the Railway Companies were.

The CHAIRMAN said the Committee agreed to give effect to the Railway Companies' request in the way suggested by the Local Government Board—viz., that it should be levied on the general district rate.

Mr. BALFOUR BROWNE said that would give him the relief he asked.

The clause was then further postponed. On clause 12,

Mr. PEMBER, on behalf of the Water Companies, moved that words be struck out, which deletion would have the effect of enlarging the Water Board's borrowing powers, so that the interest on purchase money might be secured to the Companies.

Mr. RAM agreed to insert words in clause 33 to meet the point raised; and the amendment was accordingly withdrawn.

Mr. THESIGER proposed the substitution of a term of 100 years for the 80 years given by the Bill for the duration of the sinking fund.

The amendment was rejected.

Clause 12, as verbally amended, was agreed to. On clause 13,

Mr. THESIGER proposed to delete the words "the rate of £3 per cent. per annum," and insert "such rate as the Water Board, with the consent of the Local Government Board and after consultation with the Governor of the Bank of England, may resolve."

Mr. PEMBER said the Water Companies objected to the suggestion.

Mr. MAY, on behalf of the Water Companies, said he agreed to the insertion of the words "bearing interest at such rate, not exceeding £3 per cent. per annum, as the Water Board, &c., may resolve."

The consent of the Governor of the Bank of England was deleted, and the amendment agreed to as follows: "Bearing interest at such rate, not exceeding £3 per cent. per annum, as the Water Board, with the consent of the Local Government Board, may resolve."

Mr. PEMBER then moved the deletion of sub-section 3, which read: "Subject to the provisions of this Act, the provisions of section 52 of the Public Health Amendment Act, 1890, which relates to the issue of stock by local authorities, should apply to water stock as if it were stock created under, and the Water Board were an authority mentioned in, that section." He said the Water Companies objected to this section, because it left the matter entirely in the hands of the Local Government Board. He proposed the substitution of the following: "(3) The provisions in the seventh schedule to this Act shall apply to the water stock created under this Act."

Mr. FITZGERALD said the regulations for the issue of water stock required to be carefully considered. Mr. Pember was under a mistake in supposing that once regulations had been issued and accepted by Parliament, and confirmed by an Order in Council, they could be altered so far as any stockholders who had taken stock under them were concerned. Of course, with regard to a further issue of stock, new regulations could be made. The Local Government Board could not accept the proposed amendment. They intended to have the matter most carefully considered, and then to formulate the regulations with regard to that water stock. This would be taken in hand at once; and long before the time came when any stock was to be raised, the regulations would have been issued, and everyone would know what they were. The object of the Local Government Board would be to make those regulations as convenient as possible, because that would increase the value of the stock.

Mr. PEMBER urged that the matter should be dealt with by Parliament. Once the Local Government Board had got the assent of Parliament, they could change their minds and do what they liked.

Mr. FITZGERALD said he was authorized to undertake, on behalf of the Local Government Board, that the regulations should be issued within six months of the passing of the Act.

Mr. PEMBER said that did not suit him, because he would have no voice in the matter. At present, he could explain to Parliament whether they were fair or unfair.

The Committee then deliberated in private, after which,

The CHAIRMAN said: The Committee cannot accept this amendment as proposed; but before they leave the clause, they would like to know whether there is any objection to adopting a schedule similar to that which regulates the London County Council stock.

Mr. FITZGERALD said he could not answer that question at once, but would do so at the next meeting.

The CHAIRMAN: The Committee are in favour of elasticity of arrangement within proper limits so far as the general water stock which is to be given for the ordinary shares is concerned. They recognize that it is of great advantage that the two stocks should be the same both for the ordinary shareholders and the debenture holders. Some members of the Committee, at any rate, are impressed with the possible hardship upon the debenture holders, who are forced to take a particular class of stock, not knowing before the Bill leaves Parliament what are the precise conditions under which they are forced to take stock. This suggestion has been made to satisfy those members of the Committee who are impressed with this particular objection. We are willing to give the Local Government Board time to answer the question.

Mr. PEMBER said, as far as he knew, that suggestion would satisfy him.

Mr. THESIGER said, after the undertaking which had been given by the Local Government Board, the London County Council would not press their amendment.

Clause 13 was accordingly reserved. Clause 14 was also postponed. On clause 15,

Mr. THESIGER proposed the following amendment: "Provided that in assessing the amount of stamp duty to be paid upon the expenditure comprised in any financial statements submitted to the district auditor, the payments made for purchase money of the undertaking shall be omitted." He explained that the stamp duties amounted to £15 for every £50,000. On £25,000,000. this would amount to £7500. Very little work would really be needed in the audit.

Mr. FITZGERALD said the Treasury would have to be consulted; and therefore he proposed that the amendment should be withdrawn, in order that this might be done, and that the Treasury might agree that the matter should be brought up in the House.

The CHAIRMAN: I entirely concur in that.

The amendment was accordingly withdrawn.

Mr. PEMBER said that while upon the question of stamp duty, he would like to ask who would pay it on the issue of stock—the recipient of the stock, or those who issued it.

Mr. FITZGERALD said as far as he knew, there was no stamp dufy on the issue of stock, but he was not certain of it.

The CHAIRMAN said it was quite a fair question to raise.

The clause was agreed to.

Mr. FITZGERALD said the Bill would be reprinted so far as it had been agreed to, in order to show exactly how it stood.

The Committee adjourned till Tuesday next, May 27.

LEGAL INTELLIGENCE.

WATFORD COUNTY COURT.—Monday, May 12.

(*Before His Honour Sir* ALFRED MARTEN, K.C., *Judge*)

Colne Valley Water Company v. Bretherton—Traction-Engines and Water-Mains.

In this case, the plaintiffs claimed the sum of £10 6s. 7d. from the defendant in respect of damage caused to their mains at Bushey and Stanmore, as they alleged, by a traction-engine belonging to him.

Mr. J. K. REGGALL appeared for the plaintiffs; Mr. G. C. GARDINER for the defendant.

His HONOUR, in giving judgment, said: The plaintiffs are constituted under the Colne Valley Water Acts, 1873 and 1885, and the mains mentioned in the particulars were laid during the years 1876 to 1878. At the time of the breakages, the depth of the main at Clay Hill was 3 ft. 6 in. at the place of fracture; the depth of the main at Bushey Village was 2 ft. 9 in. (where there was a hydrant broken); and the depth of the main at Stanmore was 3 feet. The service-pipe at Stanmore came from a house from the main that was broken over another main. The mains and service-pipe were properly and duly laid, and belonged to the plaintiffs at the time of breakage; and they were, as mentioned in the particulars, broken by the defendant's traction-engine. It weighed about 13 tons, and under 14 tons. It was used to draw three trucks, as a general rule, and sometimes (as at Stanmore Hill) two trucks; the engine drawing two up the hill, and leaving one at the bottom, and returning and drawing that one up afterwards. Each truck or waggon weighed from 3 to 4 tons without the load, and the average load was about 5 or 6 tons for each truck or waggon. The engine was duly licensed; and it and the trucks were being drawn on the high road in other respects under the Locomotives Act, 1898. On the part of the defendant, it was contended that he was not liable, and that he was using the highway in a perfectly lawful manner (reference being made to the Act of 1898, sections 1, 6, and 7); and it was urged that the Act, by authorizing what the defendant had done, relieved him of any liability which otherwise might have attached to him for the damage occasioned to the plaintiffs. On behalf of the plaintiffs, it was contended that the weight used was excessive—that is to say, excessive as regards the weight of traffic for which the roads were constructed and adapted, and for which the pipes were laid. The question that I have to decide is whether, as between the plaintiffs and the defendant, the law has been altered by the Act of 1898, so as to exempt the defendant from liability. In my opinion, the Act does not bear that construction. It prescribes the terms on which locomotives may be used on roads, and gives certain powers to the local authorities; but I think it does not deal with any liability as regards gas or water companies, or persons who have property or easements or rights of property which may be affected by the use of traction-engines. In *Powell v. Fall* (5 Q.B.D. 597), decided by the Court of Appeal in 1880, the defendant's traction-engine was constructed in conformity with the Locomotive Acts, 1861 and 1865, and at the time of the accident it was being driven at a proper pace, and the defendants servants were guilty of no negligence in the management of it. It was there held that the defendant was liable to compensate the plaintiff for the injury done to a stack of hay by some sparks escaping from the engine. This decision was given on the ground that, the engine being a dangerous machine, an action was maintainable at common law, and that the Locomotive Acts did not restrict the liability of the defendant. In the year 1885, there was decided by the Court of Appeal the case of *The Gaslight and Coke Company v. Vestry of St. Mary Abbott's, Kensington*, where injury was done to the plaintiff's gas-pipes, which were sufficiently below the surface not to have been injured by the ordinary mode of repairing roads if defendants' steam-roller had not been used; and it was held that the defendants were liable to the plaintiffs for the injury caused to the pipes by the rollers. Upon the whole, I am of opinion that the plaintiffs are entitled to recover the amount claimed; and I give judgment accordingly for the sum of £10 6s. 7d., with costs.

Leave to appeal was granted.

COLLIERY WORKINGS UNDER RESERVOIRS.

In the "JOURNAL" for the 1st ult. (p. 836), we reported a special case bearing upon the above subject, which was argued at great length before Mr. Justice Swinfen Eady, in the Chancery Division of the High Court of Justice. It arose out of arbitration proceedings between the Wigan Corporation, as the owners of the water-works, and the Wigan Cannel Colliery Company, Limited, to settle the amount of compensation (if any) to be paid to the Company to avoid working a particular seam of coal under a reservoir. At the close of the arguments, his Lordship reserved judgment, which he delivered last Thursday. He said that on July 29, 1899, a notice was served by the Company of their intention to work certain coal underlying the reservoir and water-works of the Corporation, who were willing to treat with the Company for payment of compensation for leaving the coal unworked. On April 20, 1900, an agreement in writing was made between the Corporation and the Company, acting by their authorized agents, by which it was arranged that the amount of compensation to be paid by the Corporation to the Company in respect of the interest of the latter in the Elms 4-feet mine should be determined by arbitration. The Umpire had stated a special case which raised questions as to the principles to be adopted in arriving at the amount of compensation. The Corporation contended that as the Company were bound, as between themselves and their lessors, by the provisions of a lease of 1874 (the term of which extended to 1893), under which they acquired the coal, to leave certain support for the water-works and adjacent and subjacent land comprised in three leases of 1868 and 1870, and that as only a portion of the coal could be removed from the Elms 4-feet mine consistent with leaving the necessary support, the Corporation were only bound to pay compensation on the footing of the Company being able to raise and remove this portion. For the Company it was contended that they were not, according to the true construction of the lease, bound to leave this support, and that, in any case, if they were under any obligation so to do, as between themselves and their lessors, such obligation did not affect their right to be paid by the Corporation for all the coal required to be left for the support of the water-works. This latter contention was, to his mind, well founded. He was of opinion that the Corporation must pay the Company for all the coal which was required to be left as support, even though the Company might not be able to get this coal without risk of liability to other persons for damage caused by working it. If this was the position in April, 1900, had it been modified in any way by the conveyance which the Corporation obtained on the 7th of November in that year. In his view, the rights of the parties must be determined, and compensation assessed as from the date of the agreement—April 20, 1900; and no interests subsequently created or acquired by either party could be taken into account, so as to increase or reduce the compensation which would otherwise be paid. The special case should therefore be answered in this way: "The Court is of opinion that, in assessing the amount of compensation to be awarded under the submission, the Umpire ought not to take into account any obligation of the Company to leave support of adjacent or subjacent minerals." He thought this was the best way of dealing with this special case.

A Disputed Gas Account.

At the Faversham County Court, a few days ago, a case was heard by the presiding Judge and a Jury in which the Faversham Gas Company sued Edward Knowles, a fruiterer and a member of the Town Council, for £12 9s. for gas supplied during the quarter ended the 31st of December last. Mr. Alick J. Tassell appeared for the Company; the defendant, who had paid £9 3s. 5d. into Court, conducted his own case. Mr. Tassell explained the precautions taken, in accordance with the Act of Parliament, to see that gas-meters were accurate. He said the index of the meter was *primâ facie* evidence of the quantity of gas consumed, and the Company were entitled to recover for the consumption the register showed. He went on to state that the defendant disputed his account for the December quarter, and subsequently, at his request, the meter was sent to London and was tested by one of the examiners of the London County Council. It was found to be 3·09 per cent. fast, and a reduction of 8s. was made. The defendant stated that it was impossible for him to have burnt the gas for which he was charged. He had exactly the same number of burners as he had had for the past five years, and they were in use for about the same time throughout the quarter; yet he was charged for 20,000 cubic feet in excess of any of the corresponding quarters of the past five years. The Jury, after some deliberation, returned a verdict for the Company for £9—being a rebate of £3 9s. for the defendant, and 3s. 5d. less than the sum he had paid. He was also allowed costs to the date of payment into Court.

Portsmouth Water-Works Company.—The report of the Directors for the half year ended March 31 shows that the available balance on the profit and loss account is £25,015, out of which they recommend the payment of the full statutory dividends. This, after deductions for void houses, &c, will leave a balance of about £8499 to be carried forward.

Water Charges at Llanelly.—A special meeting of the Llanelly Borough Council was held last Thursday—Mr. Tom Hughes presiding—for the purpose of receiving a deputation of manufacturers on the subject of a proposed new water tariff. This question has been before the Council for some time; and the Sanitary Committee have drawn up a new scale of charges, which they recommend to the Council for adoption. Their proposals may be thus summarized: For the first 500,000 gallons, 6d. per 1000 gallons; from 500,000 to 1,000,000 gallons, 5½d. per 1000 gallons, with a reduction of ½d. per 1000 gallons on every succeeding 500,000 gallons up to 4½ millions. After this total, the charge will be a uniform 2d. per 1000 gallons additional. The proposed new tariff has been received with a storm of protest from the manufacturers. As the result of the deputation, the matter was deferred, to allow of the manufacturers drawing up an alternative tariff.

MISCELLANEOUS NEWS.

BIRMINGHAM CORPORATION GAS SUPPLY.

The Annual Accounts.

At the Meeting of the Birmingham Corporation next Tuesday, the Gas Committee will submit the clauses which they propose to include in the new General Powers Bill. They are identical with those relating to the Gas Department which were contained in the Bill of last year, and approved by the Council; and the Committee are of opinion that they should all be retained. They therefore recommend that they be provisionally approved. The sum of £500,000 will be required in connection with the extension of the works of the Department; and if the Council approve the report, the power to borrow this sum will be included in the financial provisions of the Bill. Before commencing the erection of new works, the proposals of the Committee will be fully reported upon, and the sanction of the Council obtained thereto. The Committee will also present the accounts of the Department for the year ended the 31st of March last. They remind the Council that, in the years 1896-7 and 1897-8, sums of £35,000 and £50,000 respectively were contributed by the Department in aid of the improvement rate, in order that the Committee might in future make their contribution to the rate at the beginning instead of at the end of the financial year as formerly. In the year 1900-1, when the great increase in the price of coal took place, equivalent to nearly 6d. per 1000 cubic feet in the price of gas, the Committee recommended the Council only to raise the price 3d. per 1000 cubic feet, on the understanding that the contributions of the Department to the improvement rate would again have to be made at the end of the financial year instead of at the beginning; and hence the profit declared in the accounts now submitted is in aid of the rate for 1901-2. The credit balance in the profit and loss account amounts to £30,557 12s. 5d., and the Committee recommend that this sum be appropriated to the improvement rate. If this is approved, the amount contributed for public purposes by the Gas Department during the year under review will be as follows: In aid of the improvement rate, £30,557 12s. 5d.; do. (interest on reserve fund), £4000; in aid of public lighting within the city, £11,271 10s. 8d.; do. public lighting of courts in the city, £3013 7s. 5d.; do. public and court lighting outside the city, £4410 8s. 4d.—£53,252 18s. 10d.

The following is a comparative statement of the statistics of the department for the years ended March 31, 1901, and 1902 respectively:

Year ended March 31.	1902.	1901.	
Sale of gas (millions cub. ft.)	5,921	5,709	+211 (3·71 p. ct.)
New services	5,653	5,444	+209
Gas-fires fixed	65	104	−39
Cooking and heating stoves hired	3,603	3,114	+489
Do. sold	946	865	+81
Tons of coke in stock	2,842	10,342	−7500
Prepayment meters fixed	18,350	13,080	+5270

SOUTHPORT CORPORATION GAS SUPPLY.

Engineer's Annual Report.

The Engineer and Manager of the Southport Corporation Gas Department (Mr. John Booth) has presented to the Gas Committee his report on the working of the undertaking in the year ending the 31st of March last. It shows that, during the period covered thereby, plant for the mechanical stoking of the retorts, the contract for which had been satisfactorily carried out by West's Gas Improvement Company, Limited, was inaugurated; while coke-handling plant, supplied by the same Company, was completed and brought into use on the 3rd ult. Mr. Booth states that the introduction of these two plants will result in financial saving in the working of the two departments of the gas-works affected. There was an increase in the quantity of gas sold last year; but Mr. Booth cannot apportion that supplied for lighting and cooking, as in previous years, owing to all the gas sold to new consumers during the year passing through one meter, and being charged at one price, according to the district. There was an increase in the income from gas, but a decrease in that from coke and tar, owing to the market prices of these products being lower. Sulphate of ammonia, on the contrary, was better, and the yield per ton of coal higher. There was a reduction in the cost of gas-making materials and in the amount paid for wages and maintenance. The interest and sinking fund was increased, owing to the additional capital expenditure for the stoking machinery and for gas-cookers. The following is a summary of the items of income and expenditure:

Income.

		Inc.	Dec.
Gas sold (net)	£56,591	£1844	—
Residuals	12,289	—	£2452
Distribution account	1,514	808	—
Rents	1,194	321	—
Cookers account	1,668	231	—
Sundries	490	—	185

Expenditure.

		Inc.	Dec.
Manufacture—			
Coal, oil, benzol	£30,328	—	£1781
Salaries, wages, and maintenance	12,334	—	1142
Distribution—			
Wages and maintenance	4,352	—	471
Cookers account	664	£15	—
Management	2,048	125	—
Rates and taxes	1,531	—	121
Public lamps	3,020	555	—
Interest and sinking fund	11,546	1047	—

The gross profit for the year was £19,469, and the net profit £7923; being increases of £3386 and £2339 respectively on the figures for the year 1900-1. Mr. Booth's estimate was £8000. The renewals fund at the close of the year amounted to £4298, of which £500 is invested with the Corporation and the balance is in the bank. The expenditure on capital account during the year amounted to £12,376 (£1823 being for cookers and £9256 for the stoking machinery and the coke-handling plant); bringing up the total to £263,096. This was at the rate of £7 2s. 10d. per ton of coal carbonized, and 12s. 7d. per 1000 cubic feet of gas sold.

The particulars furnished by Mr. Booth with regard to manufacture and supply show that 34,190 tons of coal, 1634 tons of cannel, 1015 tons of oil, and 1097 tons of coke were used last year. The total make of gas was 428,002,000 cubic feet, or 19,450,000 cubic feet (4·76 per cent.) more than in 1900-1; the total sale being 417,108,300 cubic feet—an increase over the figures for the previous year of 12,430,700 cubic feet, or 3·07 per cent. The proportion of gas delivered for day (6 a.m. to 6 p.m.) and night consumption for the two years named is as follows:—

	Day. Cubic Feet.	Per Cent.	Night. Cubic Feet.	Per Cent.
1901-2	178,251,000	41·68	249,414,000	58·32
1900-1	162,785,000	39·78	246,428,000	60·22
Inc.	15,466,000	1·90	2,986,000 Dec.	1·90

Of the total make of gas—428,002,000 cubic feet, or at the rate of 11,282 cubic feet per ton—417,108,300 cubic feet were sold (including the gas supplied free), 2,494,000 cubic feet were used on the works, and 419,602,300 cubic feet were accounted for; leaving 8,399,700 cubic feet, or 1·96 per cent., unaccounted for. The raw material used produced the following quantities of residuals: Coke, 21,067 tons, of which 213 tons were estimated to have been used for the carburetted water-gas plant and boilers, 346 tons for the oil-gas furnaces, and 6862 tons for the coal-gas furnaces and boilers; breeze, 1187 tons; tar, 2008 tons; and ammoniacal liquor, 1,186,520 gallons.

There were collected from prepayment meters last year 596,310 pennies. Mr. Booth gives the following particulars in connection with these meters:—

Year.	No. of Meters.	Gas Consumed. Cubic Feet.	Average per Meter. Cubic Feet.	Value of Gas Consumed.	Average per Meter.
1901-2	1742	14,190,100	8145	£2484 13 2	£1 8 6
1900-1	1400	10,601,900	7572	1860 11 6	1 6 7
Inc.	342	3,588,200	573	£624 1 0	£0 1 11

The number of cookers in use at the close of the year was as follows: On hire, 2611; on hire-purchase, 24. There were 400 of the former and 8 of the latter fixed during the year.

The conversion of the whole of the Southport street-lamps from the ordinary to the incandescent system has been completed, except in those positions where the wear and tear of mantles was considered to be great.

At the Meeeting of the Southport Town Council last Tuesday, the minutes presented by the Gas Committee contained the following resolution—"That the Finance Committee be informed that the Gas Committee are of opinion that they will be able to hand over the sum of £8000 of surplus profits in the present financial year."

Mr. TROUNSON (Chairman of the Committee), in moving the adoption of the minutes, said the new stoking machinery was working satisfactorily, and they hoped that during the next twelve months it would effect a saving of not less than £1000; while the coke-handling plant was at present saving £6 or £7 a week. During the year there had been grave doubts as to whether they would be able to hand over the £8000 promised for the relief of the rates. The prices of residuals were much lower than formerly, and the decrease in income from this source alone was £2452; but, notwithstanding that, they finished the year with only £77 short of the estimated net profit. By the introduction of incandescent lighting there had been a saving of 4 million cubic feet for street lighting, equal to £466. There had been a satisfactory increase in the quantity of gas sold—viz., 12 million cubic feet; and though it was impossible to say with certainty in which direction it had taken place, seeing that the dual system of meters was being discontinued, yet as there had been a very marked augmentation in the day production, it was presumed that the advance had been in gas for heating and motive power. There had been an increase of 3½ million cubic feet through the penny-in-the-slot meters. The Gas Engineer had been instructed to fix in each house a specimen burner suitable for the gas now being supplied, seeing that the illuminating power had been reduced with the approval of the authorities in London.

Mr. J. SMITH seconded the motion.

Mr. AUSTIN said Blackpool supplied gas at 2s. 6d. per 1000 cubic feet, against Southport's 3s. The profit on the Blackpool gas estate was £10,953, or £3027 more than at Southport. If gas had been sold at Southport at the same price as at Blackpool, the profit would have been about £873 on a capital of £263,000. He called attention to a paragraph in which the Gas Manager reported that 3000 gallons of benzol had been delivered above the order given, and suggested that the Gas Committee should be instructed to offer 8d. per gallon for it. He considered the paragraph should be deleted. It was a mistake to accept 3000 gallons of such a dangerous article, and it would be dear at the price offered.

Alderman FISHER said the members of the Gas Committee considered they were making a good bargain, so they offered the Contractors something like 25 per cent. less than the actual price, rather than return the benzol.

Dr. ISHERWOOD (ex-Mayor) said he was not satisfied with the present economy effected by the mechanical stokers, which should save nearer £2000 than £1000. On their use of 34,000 tons of coal, they should save at least 1s. per ton, or £1700 a year.

Mr. GRIFFITHS said Southport was one of the few towns where the gas undertaking had come out with anything like success. He did not know a single gas-works in the country that could show better results under the circumstances. He had read the "JOURNAL OF GAS LIGHTING" during the past year, and he had not found a single Corporation which had not had to face an enormous drop in residuals.

Blackpool could not be compared with Southport, as the conditions were so different. Referring to the case of Widnes, he said the average cost of gas was 1s. 5d. or 1s. 6d. per 1000 cubic feet.

Mr. FOGGITT: The actual price is 1s. 1d. to 1s. 5d.

Alderman GRIFFITHS remarked that if Widnes were placed in the same position as Southport with regard to distribution, the gas could not possibly be supplied at anything like the price.

Mr. TRAVIS said it cost Southport 2s. 4d. per 1000 feet to put gas into the consumer's meter. This was not satisfactory.

Mr. TROUNSON, in reply, said gas was manufactured at a cheaper rate in Southport than in Blackpool; the figures being 2s. 2·63d. against 2s. 3·4d. per 1000 cubic feet. The serious difference between Blackpool and Southport was the interest and sinking fund. Southport had a lot of dead capital lying idle—the difference between the two towns in this respect being £3500 a year. In all, Southport had to pay annually £5900 more than Blackpool. Blackpool received £800 for street lighting, for which no charge was made in Southport. As to the stoking machinery, it was possible they might be able to save 1s. per ton of fuel by its use.

Eventually the minutes were passed, including the offer of 8d. per gallon for 3000 gallons of benzol, which had been delivered in excess of the contract quantity.

PUBLIC LIGHTING QUESTION AT BRADFORD.

The Gas Committee and the Rates.

At the Monthly Meeting of the Bradford City Council last Tuesday—the MAYOR (Mr. W. C. Lupton) presiding—a long discussion took place with regard to the decision arrived at in January (*ante*, p. 154) to charge the public lighting on the rates in future, instead of it being borne by the Gas Committee as heretofore. The discussion arose over the minutes of the Finance and General Purposes Committee, which stated that this Committee had been requested by the Gas Committee to provide the sum of £31,000 for street lighting purposes, to be paid from the general district rate for the current financial year, in accordance with the resolution of the Council. After consideration of the matter, the Finance Committee appointed a Sub-Committee to report on the Gas Committee's resolution and on the question of street lighting generally. On the adoption of these minutes being proposed and seconded,

Mr. JAMES FREEMAN (the Chairman of the Gas Committee) moved, as an amendment, that the minutes be adopted, with the exception of the part appointing a Sub-Committee to consider the question of street lighting. He said it was within the recollection of the Council that on Jan. 14 last a resolution was passed declaring that it was inexpedient to continue the existing system by which the cost of street lighting was borne by the Gas Committee, and consequently fell upon the gas consumers; and that from the end of the financial year then current an arrangement should be entered into between the Gas Committee and the General Purposes Committee whereby an agreed sum, subject to any necessary modifications, should be paid towards the cost of such street lighting, and that sum should from time to time be included in, and form part of, the general district rate.

Mr. T. A. GUY (rising to a point of order) suggested that the minutes of the Gas Committee on the same subject should be taken together with the minutes of the Finance Committee.

Mr. GODWIN asked that questions of which he had given notice to Mr. Freeman might be answered before the present matter was dealt with. His first question was to the effect that, seeing that the Gas Committee asked for a contribution of £31,000, and that, if granted, they would reduce the price of gas by a sum equivalent to £14,000, to what purpose did they propose to apply the balance of £17,000? He wished also to ask, in the event of the grant of £31,000 per annum not being made to the Gas Committee, to what extent was it the Committee's intention to raise the price of gas.

Mr. FREEMAN, in reply to the first question, said that the balance referred to would go to remove the adverse balance which existed upon the past year. As to the second question, the Committee had assumed that the Council would carry out the resolution of January last, and had, therefore, not considered the alternative course.

After some discussion, it was decided to take the minutes of the two Committees together.

Mr. FREEMAN then referred to the terms of the resolution of January, and said it seemed to be the intention and desire of a certain party in the Council to go behind their own resolution. The appointment of a Committee was only a means of shelving the question. If the resolution were not carried that day, it would be impossible that it should come into effect during the present financial year. The Gas Committee had already provided towards the relief of the rates £459,000, in addition to £421,000, which had been the cost of street lighting since the abolition of the lighting rate. This made a total of £880,000. Now that gas had to meet the competition of electricity, it was not fair that the gas consumers should any longer bear these heavy burdens. Bradford must follow the example of all the other large towns in the country, and pay for the street lighting out of the rates. It was impossible, for many reasons, for the Gas Committee to make in future the large profits that they had made in the past. Coal last year cost the Committee £13,000 more than it did two years previously, wages had been advanced, and the prices of all materials were still much higher than they were two years ago. The charges for rates, interest, sinking fund, and income-tax had risen by several thousand pounds; while the value of residuals was less. Owing to the fall in the price of coke alone, the Committee had lost £12,000 in the past year. The reduction of the price of gas in North Bierley had cost the Committee £2000, though the extra rates from this district had benefited other Committees by over £5000. The Gas Committee had also had to bear the additional cost of lighting the added districts, which amounted to £7000. The manufacturing expenses of Bradford gas were among the very lowest in the country; but, on account of the heavy charges already enumerated, there was an actual loss for the year just ended of nearly £12,000. Since all the accumulated gas profits, except £3000, had already been taken for the rates, the Committee had an actual deficit of £9000 to begin the present financial year with. They hoped to be able to save 1s. a ton on coal during the coming year; but the reduction of the price of gas in Thornton, Allerton, Idle, and Eccleshill would mean a loss of another £4200, and there was little prospect of an advance in the value of residuals. If the Committee were paid £31,000 for the street lighting this year, and reduced the price of gas by 2d. per 1000 cubic feet, they should have a profit on the year of £9000, which would just cover their present deficit. Street lighting last year cost: For wages, £10,448; for materials, chiefly mantles and repairs to lamps, £4881; for gas bought from Companies, £3244; together with the value of the gas of their own manufacture—reckoned at the minimum selling price—£12,142. This made the total cost £30,716. Of this sum, £597 was spent upon new lamps. Even if the Corporation gas was calculated at the actual cost price last year of 2s. 1½d. per 1000 cubic feet, the total cost of the public lighting was only reduced to £30,300. If they were paid for the street lighting, they would save more than £1000 per year for income-tax.

Mr. JOHN ARNOLD seconded the resolution.

Mr. W. LAND said he was not himself in favour of the proposed change; but as the Council had in January resolved to make it, they should stand by their word.

Mr. GODWIN remarked that the Gas Committee were not adhering to the resolution of January last. The fact that it was stated that an agreed sum should be paid, implied that there should be a conference of the two Committees to come to an agreement. Four months had elapsed since then; and the Gas Committee had done nothing to obtain a conference, but came there and demanded a sum of £31,000, without giving the Council any opportunity of inquiring into the figures. He believed that the movers in the matter of the resolution of January last did not wish to take a single step from the position they then held. They considered that it was fair that gas consumers should not be required to pay for the lighting of the streets for those who did not contribute towards the gas profits. But the answer of the Chairman of the Gas Committee to his (Mr. Godwin's) question showed very clearly what was in Mr. Freeman's mind. He wished to get hold of a sum of £17,000 to make up losses on the working of the past year. The subject also involved the Electricity Committee; for it was only fair that this Committee should be paid for the streets they lighted if the Gas Committee were paid for other street lighting. Consequently, the matter was essentially one for a conference.

Alderman J. S. TOOTHILL thought it was a good principle that every tub should stand on its own bottom; but the Council could not allocate a sum of £31,000 without any inquiry into the items.

Mr. H. GRAY said it had been decided by the Council that the lighting should be paid for by rate. It would be easy for the officials in an hour or two to decide what the cost of the lighting had been.

Mr. GUY, as the mover of the resolution of January, complained that, though the resolution distinctly said the sum to be paid out of the rates was to be an "agreed amount," the Gas Committee had done nothing to bring about a conference. The appointment of a Committee representing the Finance Committee, the Gas Committee, and the Electricity Committee was the natural and proper step. They had a right to inquire into the figures. The cost of lighting was now said to be £31,000; but in the published accounts it was put down as £22,306—which showed a substantial difference. Then it was not fair to claim the fixing of a sum upon the basis of a year when gas had been dearer to manufacture than for many years, and to take no account of a more favourable prospect in the future. As the present contracts expired, coal would be obtainable more cheaply, and residuals were increasing in value day by day; so that with proper management it ought not to be long before the old scale of profits was again being earned. In the past year, there had been considerable expenditure in the conversion of old burners into incandescent lights, which would not occur again. Consequently, to take last year's figures as the basis of the calculation was not fair. These were questions which the Finance Committee ought to have opportunities of considering before action was taken.

Mr. J. HAYHURST said the question at stake was not whether the ratepayers should pay for the street lighting, but whether the Council would face an increase of rates. It would be easy, he said, for the two Committees to meet after the resolution had been carried. It was a question of who should raise the rates.

Mr. FREEMAN, in reply, maintained that there had been no delay on the part of the Gas Committee. He knew of no other city in England which paid for street lighting out of the gas profits. Mr. Hayhurst had, he considered, made a good suggestion—namely, that after the resolution had been passed that day, the two Committees could then have a conference. When he presented figures carefully prepared for him by an official of the Corporation, he submitted that some respect should be paid to them. With regard to residuals, he was told by the Gas Engineer (Mr. Charles Wood) that there was very little possibility of any increase in their value taking place at present. If there should be any advance, the Corporation would get the benefit of it.

Alderman WILLIS WOOD (the Chairman of the Finance and General Purposes Committee), in replying on the discussion, said his Committee had not had the slightest opportunity of discussing any suggested arrangement with the Gas Committee. It was said that there should be an "agreed sum;" and this must mean that there should be some agreement between the two Committees. The Gas Committee had had the matter in hand for four months; and on Thursday morning last they made a sudden demand on the Finance Committee for £31,000. It was not known on what figures this demand was based.

The amendment was then defeated by 39 votes to 26.

Alderman H. B. RATCLIFFE suggested that the reference to the Committee be somewhat enlarged. He had a strong feeling that they should not put any extra charge for lighting on the district rate fund, but on the city fund. Some of the largest ratepayers in the city had three-fourths exemption under the district rate; and they were the very people the Council were trying to get at.

The minutes of the Finance and General Purposes Committee were then formally adopted.

Mr. FREEMAN next moved the adoption of the minutes of the Gas

Committee, which contained a resolution, dated May 2, to the effect that the Finance and General Purposes Committee be requested to provide £31,000 for street lighting, to be paid from the general district rate for the current financial year, in accordance with the resolution passed by the Council on Jan. 14. The Gas Engineer submitted a report and financial statement showing approximately the estimated receipts and expenditure during the current year, whereupon the Committee considered the questions of price of gas and discounts. After discussion, the subject was adjourned for consideration at a special meeting on May 6, when it was resolved that, subject to the Council sanctioning the granting out of the general district rate of the sum of £31,000 for the cost of street lighting, the price of gas be reduced from 2s. 6d. to 2s. 4d. per 1000 cubic feet as from July 1 next.

Mr. J. ARNOLD seconded the motion.

Mr. J. T. RIDDIOUGH asked if anything had been done to lower the price of gas at Bolton Woods to the same rate as was charged in other parts of the city, or if there was any immediate prospect of the price being reduced.

Mr. FREEMAN replied that six months' notice had been given to the Shipley District Council that the City Council proposed to take over the lighting of that portion of the city included in the Act of the now defunct Shipley Gas Company. The notice would shortly expire; and then he, Mr. Freeman, apprehended that both Frizinghall and Heaton would be dealt with, and the same price charged as in other parts of the city.

The minutes of the Gas Committee were then adopted, subject to the cancellation of that portion dealing with the grant of £31,000 for street lighting and with the proposed reduction in the price of gas from 2s. 6d. to 2s. 4d. per 1000 cubic feet.

COLNE CORPORATION GAS UNDERTAKING.

The Past Year's Working.

At the Meeting of the Colne Town Council last Wednesday week when the minutes of the Gas Committee came up for consideration, the Chairman (Alderman Knight) said he wished to make a statement with regard to the working of the department. In the first place, the capital invested on the works and mains up to date amounted to £111,660; and of this, £17,540 had been repaid, leaving the net value of the works at £94,120. On revenue account, £22,327 had been expended, against £19,468 in the previous year, or an increase of £2859. The income from gas and residuals was £24,405, or an increase of £726; and the net profit for the year had been £2157, against £4528 in the previous twelve months. The fall in profits was due to several causes. Coal had been dearer, and lower prices had been obtained for residuals and other things. During the year, there had been carbonized 12,575 tons of coal, costing £8166, as against 12,045 tons, costing £6304 in the previous year. They were paying an advance of 2s. 6d., or practically about 10s. per ton, until the end of June last year; and at that time they had a fair stock in hand. The receipts from residuals amounted to £5603, against £6476 in 1901—a fall of £873. Interest and sinking fund amounted to £5001, or £753 more. The quantity of gas manufactured was 139,439,000 cubic feet, against 133,714,000 feet, an increase of 4·28 per cent. The increase was not so great as was expected, owing to electricity and incandescent lighting; but in future he hoped that this matter would be improved. Unaccounted-for gas showed a slight increase on the previous year—viz., 3·6 per cent., against 3·1 per cent. There were now 5476 consumers, 2352 of whom used slot meters. During the past year, there had been an increase of 150 consumers. They had in use 1912 cookers (an increase of 294 over the previous year), 269 boilers, and 171 grillers. There were 642 street-lamps, the consumption of gas in which amounted to 8,024,000 cubic feet. Incandescent burners played a most important part in the lighting of the town; and the extension of the system ought to receive due consideration in the future, unless the Electricity Department were going to light the streets. The old custom of charging the district fund with the lighting of the town was abandoned four years ago; and the cost was now entirely defrayed by the Gas Department. It might be mentioned that, under the old plan, the lighting account would have been £1801, and to this extent would have improved the profits of the Gas Department. They were now improving the supply of gas to the neighbouring district of Trawden. There was also another district over which they expected to hold the lighting powers in a short time. Foulridge had 126 consumers of gas and 24 public lamps, with a consumption of 1,300,000 cubic feet per annum. By reducing the price to a level with that charged to Trawden, and introducing cookers and boilers, it was confidently expected that the consumption could easily be doubled. He hoped the work would be carried out. The gas works had had no large additions made to it during the past twelve months; but the plant had been kept in a thorough state of repair. He was sorry the profits were very small; but everything had been against them. Whatever they bought had been dearer; and everything they had had to sell realized less. Last year the Finance Committee asked them for £1600, and with great misgivings they promised to raise this; but they never thought they could manage it until a fortnight ago. Not a penny had been spent which they could possibly save; but they could always make a point of this—that when the Gas Engineer (Mr. F. Thorpe) said he would make £1000 he would make £1500. If there had been a bigger balance, he should have moved a reduction in the price of gas.

A meeting of the Directors of Messrs. Brunner, Mond, and Co., Limited, was held at Winnington last Wednesday, when it was decided to recommend a dividend on the ordinary shares for the six months ending March 31 at the rate of 35 per cent. per annum, which, with the interim dividend, makes 32½ per cent. for the year. It is proposed to place £60,000 to the suspense account, write off £2500 from patents, and carry £37,000 forward. A year ago the distribution was at the rate of 40 per cent. per annum, the dividend for the twelve months was 35 per cent, £2500 was written off patents, £69,000 added to reserve, and £38,170 carried forward.

INCANDESCENT GAS LIGHTING IN LAMBETH.

At the Meeting of Lambeth Borough Council on Thursday evening, the Lighting Committee submitted a financial statement as to the conversion, in the public lighting of the borough, of the old flat-flame gas-burners to the incandescent system. The Chairman of the Committee explained that the Gas Company had undertaken to carry out the conversion, and to charge the old price per lamp until the cost had been repaid out of the saving of gas effected. This had been done on the 25th of January, and the altered lamps would now be charged at reduced rates. It was in 1899 that the conversion had been commenced, and the following were the expenses in that year: July quarter, £170 5s. 6d.; September quarter, £840 2s. 6d.; December quarter, £1448 19s. 6d. The savings were: July, £2 5s. 7d.; October £150 16s. 3d. In 1900 the expenses of conversion were: March £319 7s. 5d.; June, £311 1s. 10d.; September, £166 9s. 11d.; December, £138 5s. 4d. The savings in that year were: January, £355 17s.; April, £382 9s.; July, £425 19s.; October, £434 4s 10d. In 1901, the expenses of conversion were: March, £362 9s. 6d.; June, £122 10s.; September, £5. The savings in that year were: January, £438 5s. 4d.; May, £441 4s.; July, £452 2s. 11d.; October, £438 10s 10d. From October, 1901, to Jan. 25, 1902, there was a saving of £362 16s. 9d. This brought the total saving to £3884 11s. 6d., which was the cost of the conversion. Several councillors expressed satisfaction at the report, and it was adopted.

GAS v. ELECTRICITY IN SOUTHWARK.

At the Meeting of the Southwark Borough Council on Wednesday evening, a letter was received from the Secretary of the County of London and Brush Provincial Electric Lighting Company, Limited, offering, on behalf of the Company, to supply current for all-night public lighting in bulk at a flat rate of 2d. per unit, and stating that they trusted this low charge might induce the Council to adopt electricity for lighting all the public streets throughout the borough. The communication was referred to the Joint General Purposes and Electric Light Committee. Subsequently, Mr. Attenborough moved, pursuant to notice—"That all streets in the borough not at present lighted by electricity or incandescent gas be lighted in future by incandescent gas, and that the Works Committee be requested to take immediate steps to effect the same." He said that while he did not desire to say anything against the electric light, he thought it would now be admitted that incandescent gas was the best illuminant for their purposes. After a short discussion, during which several councillors remarked that the back streets were at present very badly lighted, the motion was referred to the Works Committee for consideration.

TEXAS OIL FOR GAS MAKING.

A Big Contract.

A few days ago a report appeared in several of the London newspapers, and was extensively copied, to the effect that the oil wells of Texas, including those on Spindle Top, had ceased to be "gushers," though responding readily to pumping operations. We learn from the "Financial News" that Dr. Boverton Redwood, the technical adviser to the Oil Company, has received the following cablegram from Beaumont, Texas: "Unfavourable reports false. Hogg-Swayne five wells still 'gushers.'—HILL, Government Inspector." It is stated that information to hand from the Company's Manager at Beaumont confirms Mr. Hill's statement. The circulation of the report above referred to caused some little alarm, as the oil is largely used for gas-making purposes. In connection with this matter, the current number of "Progressive Age" contains the following paragraph: "It is reported that the United Gas Improvement Company have awarded a contract to the Lone Star and Crescent Oil Company involving more than $2,000,000, for the delivery of 1,500,000 barrels of crude Texas oil per annum for a period of five years. The oil will be used in the manufacture of illuminating gas, and means a saving of 50 c. a barrel to the United Gas Improvement Company, averaging $750,000 a year. The contract—the largest ever made in Texas oil—is effective at once; and the deliveries of oil are to be made at New York and Philadelphia. The oil will be sent from the Lone Star and Crescent gushers in the Beaumont fields through a pipe-line to Sabine Pass, Texas, thence by steamers to this city and New York. The United Gas Improvement Company's new process of refining it for illuminating purposes, in which the great quantity of sulphur is eliminated by an improved method, will displace the more expensive refined product. The exact location of the refining plants has not yet been decided on; but until then the plants at Point Breeze will be used. Their probable location is declared to be Marcus Hook, which, in this event, will become the most important refining centre for Texas oil in the East. The Sun Company's works are located there. Less than six months ago the Sun Company began the manufacture of refined oil, and have been very successful. The Marcus Hook plant consists of eight retorts, 40 ft. by 12 ft. Each of these retorts holds 600 barrels of oil, giving the plant an average capacity of 4800 barrels. The storage tanks are also much larger than ordinary. Usually oil-tanks are 90 feet in diameter and six sheets high. Those at Marcus Hook are 114 feet in diameter, and eight sheets high. These have a capacity of 50,000 barrels. The United Gas Improvement Company's plant, plans for which have not yet been definitely decided on, will be patterned after the Sun plant. Texas oil usually develops a most unpleasant odour in combustion, which naturally militates against it as an illuminant. The United Gas Improvement Company's chemists, by an improved process of their own, will be able to overcome this objection, and obtain good oil at a lessened cost. A tank steamer will supply the new refining plant with crude oil direct from the Texas oil-wells of the Lone Star and Crescent Company."

GAS v. ELECTRICITY AT WEST BROMWICH.

A Comparison of Cost.

In the "JOURNAL" for the 6th inst., reference was made to the controversy going on at West Bromwich over a circular-letter issued by the Engineer of the Electric Lighting and Power Department of the Corporation (Mr. J. H. Wray), purporting to give the relative cost of electricity and gas for lighting purposes. It may be remembered that, at the meeting of the Town Council in March, Mr. Bushell, the Chairman of the Gas Committee, challenged the correctness of the figures adduced; and an explanation was called for. This was furnished by Mr. Wray, who stated that a clerical error had been made in taking the price of gas at 2s. 7d. instead of 2s. 5d. on a consumption of 50,000 cubic feet and upwards per quarter, and by omitting to deduct the discount of 5 per cent. on the various amounts. He put these matters right, and submitted the results shown in the foregoing table.

It will be noticed that the calculations in the foregoing table are based on a consumption of 4 watts per candle. But as lamps can now be obtained which consume only 3½ watts, Mr. Wray compiled another table more favourable to electricity :—

40 8-Candle Power (Watt) Electric Lamps = 320 Candle Power.					27 5-Feet Ordinary Gas-Burners = 320 Candle Power.	
Hours per Day and Quarter.	Cons. in Units.	Charged.	Amount.	Average.	Cons. and Rate.	Amount.
			£ s. d.	d.	Cub. Ft.	£ s. d.
					12,000 at 2s. 9d.	1 13 0
					5 p. ct. dis.	0 1 8
						1 11 4
1 91	116	116 at 4½d.	2 3 6	4½		
2 182	232	116 at 4½d.	2 3 6		24,000 at 2s. 9d.	3 6 0
		116 at 1½d.	14 6		5 p. ct. dis.	0 3 3
		232	2 18 0	3		3 2 9
3 273	348	116 at 4½d.	2 3 6		36,000 at 2s. 7d.	4 13 0
		232 at 1½d.	1 9 0		5 p. ct. dis.	0 4 7
		348	3 12 6	2½		4 8 5
4 364	464	116 at 4½d.	2 3 6		49,000 at 2s. 7d.	6 6 7
		348 at 1½d.	2 3 6		5 p. ct. dis.	0 6 3
		464	4 7 0	2¾		6 0 4
5 455	580	116 at 4½d.	2 3 6		61,500 at 2s. 5d.	7 8 7
		464 at 1½d.	2 18 0		5 p. ct. dis.	0 7 4
		580	5 1 6	2·1		7 1 3

40 8-Candle Power (3½ Watt) Electric Lamps = 320 Candle Power.					27 5-Feet Ordinary Gas-Burners = 320 Candle Power.	
Hours per Day and Quarter.	Cons. in Units.	Charged.	Amount.	Average.	Cons. and Rate.	Amount.
			£ s. d.	d.	Cub. Ft.	£ s. d.
					12,000 at 2s. 9d.	1 13 0
					5 p. ct. dis.	0 1 8
						1 11 4
1 91	102	102 at 4½d.	1 18 3	4½		
2 182	204	102 at 4½d.	1 18 3		24,000 at 2s. 9d.	3 6 0
		102 at 1½d.	12 9		5 p. ct. dis.	0 3 3
		204	2 11 0	3		3 2 9
3 273	306	102 at 4½d.	1 18 3		36,000 at 2s. 7d.	4 13 0
		204 at 1½d.	1 5 6		5 p. ct. dis.	0 4 7
		306	3 3 9	2¼		4 8 5
4 364	408	102 at 4½d.	1 18 3		49,000 at 2s. 7d.	6 6 7
		306 at 1½d.	1 18 3		5 p. ct. dis.	0 6 3
		408	3 16 6	2¼		6 0 4
5 455	510	102 at 4½d.	1 18 3		61,500 at 2s. 5d.	7 8 7
		408 at 1½d.	2 11 0		5 p. ct. dis.	0 7 4
		510	4 9 3	2·1		7 1 3

The matter came before the Council at their last meeting, on a report of the Electric Lighting Committee, when Mr. Bushell again disputed the accuracy of the comparison, and eventually the question at issue was referred back to the Committee.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1342.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	100—102	..	4 18 0
200,000	5	May 14	6½	Bombay, Ltd. . . .	6—6¼*	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¾—4¾*	+¼	5 9 5
380,000	Stk.	Feb. 13	12	Brentford Consolidated	255—260	..	4 12 4
270,000	,,	,,	9	Do. New . . .	188—193	..	4 13 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	128—133	..	3 15 2
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	112—115	..	3 9 7
220,000	Stk.	Mar. 13	10	Brighton & Hove Orig.	205—210	..	4 15 3
246,320	,,	,,	7	Do. A. Ord. Stk. .	148—153	+1	4 11 6
420,000	20	Apl. 11	10	British.	40—41	..	4 17 7
50,000	10	Feb. 13	12	Bromley, Ord. 10 p.c. .	23—25	..	4 16 0
82,850	10	,,	9	Do. 7 p.c. . . .	18—20	..	4 10 0
500,000	10	May 14	6	Buenos Ayres (New) Ltd.	9½—10½*	..	5 14 3
220,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
150,000	20	Mar. 13	8½	Cagliari, Ltd. . . .	21—23	..	7 3 6
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	53—55*	..	5 9 1
550,000	Stk.	Apl. 11	12	Commercial Old Stock	267—272	..	4 8 3
236,425	,,	,,	9	Do. New do. .	205—210	..	4 5 9
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	,,	9	Continental Union, Ltd.	145—150	..	6 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	155—160	..	4 7 6
575,000	Stk.	Feb. 27	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—127	..	3 18 9
486,090	10	Jan. 30	10½	European, Ltd. . . .	18½—19½	..	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13½—14½	..	5 8 8
15,243,200	Stk.	Feb. 13	4⅗	Gas- 4 p.c. Ord. . .	93—95	+1	4 12 7
2,600,000	,,	,,	3½	light 3½ p.c. max.	89—91	..	3 16 11
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	107—110	−½	3 12 9
4,193,975	,,	Dec. 13	3	Coke 3 p.c. Con. Deb.	90—92	..	3 5 3
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	May 14	10	Imperial Continental .	205—208*	..	4 16 2
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	100—102	..	5 8 8
561,000	Stk.	Feb. 27	10	Liverpool United A	215—219	..	4 11 4
718,100	,,	,,	7	Do. do. B . .	166—168	..	4 3 4
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	118—120	..	3 6 8
75,000	5	Dec. 13	4	Malta & Medn., Ltd. .	4¼—5	..	4 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	105—109	..	4 11 9
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9½—10⅜	..	6 13 4
1,595,892	Stk.	Feb. 21	4⅜	Newc'tle & G'tesh'd Con.	106—108	..	4 1 0
346,855	Stk.	Dec. 27	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	Nov. 28	8	Oriental, Ltd. . . .	7⅛—7⅜	..	5 3 3
135,000	4½	,,	8	Do.	6¾—7	..	5 2 11
15,000	1	,,	8	Do.	1⅛—1⅜	..	4 11 5
60,000	5	Mar. 13	7	Ottoman, Ltd. . . .	6⅜—6¾	..	5 3 8

* Ex. div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Apl. 25	7	River Plate Ord. . .	10—10½*	..	6 13 4
250,000	Stk.	Dec 30	4	Do. 4 p.c. Deb..	95—98	..	4 1 8
250,000	10	Mar. 26	8	San Paulo, Ltd.. . .	11½—12½	..	6 8 0
135,000	Stk.	Mar. 13	10	Sheffield A	239—241	..	4 3 0
209,984	,,	,,	10	Do. B	238—240	..	4 3 4
523,498	,,	,,	10	Do. C	237—239	..	4 3 8
5,850,000	Stk.	Feb. 13	5	South Met., 4 p.c. Ord.	121—123	+1	4 1 4
1,627,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	92—94	..	3 3 10
380,940	Stk.	May 14	5	Southampton Ord. . .	102—106*	..	4 14 4
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	100—102	..	3 17 8
120,000	Stk.	Feb. 27	5½	Tottenham and Edmonton A. 5 p.c. B. 3½ p.c.	120—125	..	4 8 0
260,520	,,	,,	4		95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	7—8	..	6 5 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—100	..	5 0 0
230,000	5	Mar. 13	9	West Ham, 10 p.c. . .	9—10	..	4 10 0
172,000	10	,,	6	Do. 7 p.c. . .	13—14	+½	4 5 8
140,900	Stk.	Dec. 30	4	Do. 4 p.c. Deb	105—110	..	3 12 9
				WATER COMPANIES.			
780,599	Stk.	Dec. 30	11½	Chelsea, Ord. . .	305—315	..	3 13 0
150,000	,,	,,	5	Do. 5 p.c. Pret. .	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	..	3 2 1
175,785	,,	Mar. 26	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
1,720,560	Stk.	Mar. 26	8	East London, Ord.. .	207—212	+2	3 15 6
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	143—148	..	3 0 10
1,018,046	,,	,,	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3
700,000	50	Dec. 13	8	Grand Junction 10 p.c. max.. 4 p.c. Deb..	113—118	..	3 7 10
310,000	Stk.	Mar. 26	4		127—130	..	3 1 7
708,000	Stk.	Feb. 13	16	Kent	300—310	..	5 3 3
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—210	..	3 6 8
1,043,800	100	Dec. 30	10½	Lambeth, 10 p.c. max..	295—300	..	3 10 0
406,200	100	,,	8	Do. 7½ p.c. max..	210—220	..	3 12 9
350,000	Stk.	Mar. 26	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
500,000	100	Feb. 13	12⅛	New River, New Shares	405—415	..	3 1 8
1,000,000	Stk.	Jan. 30	4	Do. 4 p.c. Deb..	127—132	+1	3 0 7
902,300	Stk.	Dec. 13	7	South-wark and Vauxhall Ord. . . . 7½ p.c. max. 5 p.c. Pref.. 4 p.c. A Deb.	193—198	..	3 10 8
126,500	100	,,	7		185—190	..	3 13 8
489,200	Stk.	,,	5		153—158	..	3 3 3
1,019,585	,,	Apl. 11	4		125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .	285—295	..	3 7 9
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
200,000	,,	Mar. 13	3	Do. 3 p.c. Deb. .	95—97	..	3 1 10

* Ex. div.

FELLING A GAS-WORKS CHIMNEY.

On Saturday, the 10th inst., an unusual spectacle was witnessed at the Brentwood Gas-Works. The contemplated enlargement of the works necessitated the removal of a huge chimney-shaft, formerly used in connection with the kilns of a brickyard which existed on the site. The shaft had been standing idle for several years, and the kilns had been removed. Its base was 12 feet square, with walls 3 feet thick; and the structure gradually tapered to 6 ft. 6 in. square at its summit, 99 feet above the ground. It contained 90,000 bricks, and weighed 340 tons. The work of felling the shaft was entrusted to Mr. R. Claydon, builder, of Brentwood, under whose direction workmen were engaged for three days in cutting away the brickwork at the base, and substituting timber supports. Three sides of the base were removed, and the wooden supports were so arranged that if everything occurred as expected the shaft would fall clear of a building in close proximity. Just before the time fixed for the demolition, a ton of coal was placed among the timber, and the supports were rendered highly inflammable by a liberal application of paraffin oil and tar—a barrel of each being poured over the wood and coal. The supports were set on fire just before ten o'clock, and in an instant the flames leaped up, and smoke belched from the chimney top. Among the interested crowd who watched the event were several Directors and the Manager (Mr. R. M. Couper). In about ten minutes the supports began to weaken, and a crack was observable. This gradually lengthened and widened, until a large piece of brickwork fell out, and the stack crumpled up. The collapse was almost like the closing of a concertina—the greater part of the brickwork falling just round the base of the shaft. The upper part toppled over in the direction anticipated, and the demolition was accomplished with only the displacing of a brick pier in a disused shed, whereas it would not have been unexpected if this shed had been cut in two by the falling column. The demolition was most satisfactorily accomplished, and Mr. Claydon was cordially congratulated by the Directors upon the complete success of the unusual undertaking.

GAS SUPPLY OF BASEL (BALE).

At a Meeting of Swiss Gas Engineers at Bâle in September last, Herr Miescher gave the following particulars of the development of the local gas-works, of which he is Manager: The output of gas in the year 1885 was 190,396,207 cubic feet, while in the year 1900 it was 371,207,910 cubic feet, or nearly double. In the same period, the number of consumers had increased from 3947 to 13,366, or nearly 3½ times. This growth is attributed more especially to the increased employment of gas for cooking purposes. In Switzerland, gas cooking influences the consumption at various hours of the day—*e.g.*, at Zurich in the beginning of September the consumption at 11 a.m. was about the same as during the evening. In that town the consumption of gas for cooking in the summer months of last year showed an increase of 38 per cent. In the year 1900, there were in Bâle 2667 street-lamps, with a gas consumption of 30,154,784 cubic feet; while in the year 1893 there were only 1977 lamps, but yet the consumption was 30,658,970 cubic feet, or slightly higher than in 1900. The important influence of the introduction of the Welsbach light is clearly shown here. The average price of gas is at present 16c. per cubic metre (= 3s. 8d. per 1000 cubic feet) At this price, in the year 1900 the receipts were about £27,964. The net profit amounted to about £15,692, or, in round numbers, 4c. per cubic metre (11d. per 1000 cubic feet), which is equivalent to 25 per cent. profit on the gas sold. The bulk of the profit was devoted to the extinction of loans on account of the gas and electricity works. Notwithstanding the enlargement of the works, which are now equal to an output of over 500 million cubic feet, the building account, owing to the large amounts written off yearly, now stands at only £10,480, which may be considered very moderate. The works have been completely rebuilt and equipped with the latest appliances for conveying coal and coke. A machine which exhausts the coal dust produced when the coal is broken, and collects it in a suitable apparatus, so that it can be made use of, is worthy of particular mention. The newly-built settings have inclined retorts. The coke is automatically carried from the settings to the breaker by a De Brouwer conveyor.

ELECTRIC LIGHTING NOTES.

Heavy Electric Light Deficit at Luton.

With a debit balance of £1459 9s. 9d., the Electric Light Committee of the Luton Corporation commence their new financial year. The loan charges, interest, and principal amount to £1606, and the cost of generation and management are estimated at £1122. The income is put at £1530; and the deficit this year is estimated at £1198. It is proposed to pay from current account during the present financial year the £1459 mentioned, and £500 on account of the estimated loss. The total burden on the rates will thus be nearly £2000, or just over a rate of 3½d. in the pound.

High Voltage and Increased Charges at Sheffield.

The writer of the column of general gossip, under the heading of "Men and Things," in the "Sheffield Independent," made the following remarks last Thursday on the above subject: "When the consumers of electricity a few weeks ago complained of the increase of their quarterly bills from the Electric Supply Department, thinking this was due in some way to the recent change in the voltage of the current, they did not know that the Improvement Committee of the Corporation were also finding themselves in the same position. Possibly, had the discontented customers of the Electricity Department been able to ally themselves with so influential a body as another Corporation Committee, their complaint would not have been dismissed so cavalierly. But the fact is the bills for lighting the Town Hall have

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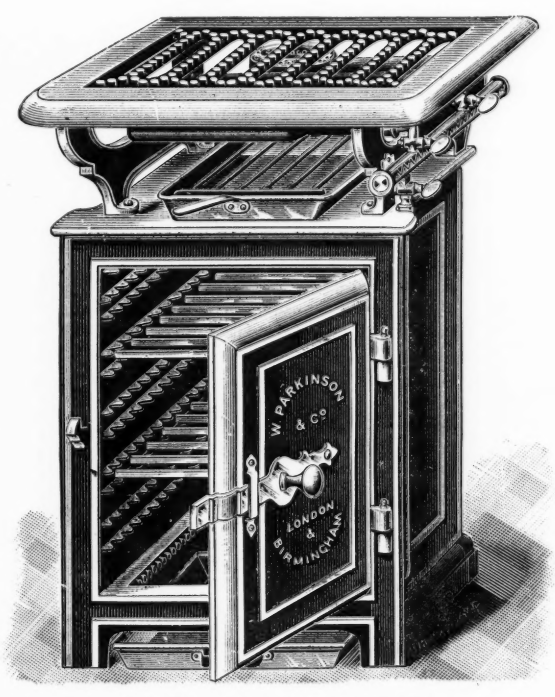

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gone up so markedly and unaccountably that the Committee which has this matter in charge is demanding an explanation. Here is another opportunity for Sir Frederick Mappin. Whatever the general advantages of electric lighting, it cannot be seriously contended that in Sheffield it is economical in comparison with the cost of gas; and least of all is this the case in regard to arc lights. For street lighting, where the air cannot be exhausted by the burning of the gas, incandescent gas-lamps are incontestably the better and by far the cheaper light; and I do not think anybody would have the least cause of regret if the arc-lamp standards round the Town Hall disappeared to-morrow in favour of the best the Gas Company could do in the way of incandescent lighting. Unfortunately, it is scarcely likely they will be allowed to try."

Tiverton and Electric Lighting.

Tiverton is clearly not consumed with anxiety for the introduction of the electric light. After considering the matter for many months, the Town Council recently came to the wise decision that, before embarking on a scheme which offered doubtful advantages, and if it prospered was likely to check the growth of the municipal gas undertaking, they would try to discover whether there was any real demand for electric lighting. Circulars were sent out to householders within the compulsory area of supply. The result was reported to the Council yesterday week. About 1800 circulars were issued, and, as was to be expected, the great majority elicited no response. In fact, only 341 persons replied, and 305 of these said they did not want electric light, 28 said they did, and 8 others were willing to become customers under various conditions which they specified. The report appears conclusive enough; but it left some members of the Council still unsatisfied. Alderman Amory voiced the feeling of some of these by protesting against the sacrifice of the Council's Provisional Order, and so letting in a company who would establish electric lighting works. With a view to averting this disaster, he proposed that an engineer should be consulted as to the best and most economical means of establishing electricity works in connection with the gas undertaking, so as to supply the electric light to those who want it. On the other hand, Mr. Partridge moved that no further steps should be taken in the matter; and this was strongly supported by, among others, Mr. Cottrell, who said there were hundreds of people in the town strongly opposed to the installation of electric lighting. Other members were averse to the expenditure of any more money for expert advice on the subject. In the end, the proposition that an engineer should be engaged was dropped in favour of a motion to refer the matter back to the Lighting Committee for a further report. This was carried by a majority of 15 votes to 6.

Electric Lighting Scheme for Sudbury.

Electric lighting matters occupied the attention of the ratepayers of Sudbury to a considerable extent last week. The Corporation are desirous of carrying out a scheme at a cost of £12,000; but as the town is already burdened with loans amounting to about £41,000, and the rateable value of the place is £21,000, the ratepayers do not seem to be very keen on having any addition. They made this feeling evident at a meeting held on Wednesday, when the proposal was characterized as a "monstrous waste of money." As a proof of the indifference of the townspeople on the matter, one speaker said that in a few days, without paid canvassers, 568 signatures had been obtained against the scheme. A resolution was unanimously passed protesting against it. The following day, Mr. H. H. Law, M.Inst.C.E., held an inquiry into the application of the Corporation to the Local Government Board for the above-named sum. Mr. Bartley Dennis appeared in support of it, and said he had engineering evidence to prove that if 6000 8-candle lamps were taken, and current was sold at 5½d. per unit, the scheme could be worked at a profit. He thought the charge would never be more than 6d., which, he said, would be equivalent to gas at 3s. or 3s. 6d.—let them say 3s. 3d. per 1000 cubic feet. Counsel was more confident of his comparison than the Inspector, who remarked that it was impossible to fix the equivalent. Mr. Dennis thought there might possibly be a loss on the first year or two. Mr. W. C. C. Hawtayne gave particulars of the scheme, which was opposed by Mr. A. H. Poyser on behalf of a number of ratepayers. He contended that the real kernel of the whole thing was the fact that the Corporation had incurred an expense of over £800 in getting up the scheme. The Council had borrowed up to their eyes, until their net rateable value had been spent, or would be spent if the loan were granted, two-and-a-half times over. He maintained that they could not borrow £2 10s. in the pound on their rateable value. He said it was a miserable bit of a scheme, and held that in face of the strong opposition it ought not to be granted. The Inspector's report will be awaited with interest.

The Cost of Public Lighting at Worcester.

The experiences of Worcester in connection with its electric lighting scheme have not been quite of a character to inspire confidence, and some members of the City Council appear to be gradually awaking to the consciousness that the undertaking is hardly worth its cost. In presenting the annual statement of accounts at the last meeting, Alderman Millington, the Chairman of the Finance Committee, drew attention to the manner in which the cost of public lighting has increased since the Corporation began to light the principal streets with electric lamps. Ten years ago, the cost was barely £3075 for lighting; there being at the time 1000 gas-lamps, the cost of which was £2 17s. 6d. each per annum. To-day the cost is £4600—an increase of 50 per cent. For this larger sum the city has 913 gas-lamps at £3 per annum, 45 all-night arc lamps at £27 2s. per annum, 12 half-night arc lamps at £11 6s., and 70 incandescent lamps varying from £3 to £9 5s. per lamp per annum. Altogether, the number of lamps has increased by 40, while, as Mr. Millington added, the cost has gone up by £1525, with a doubtful corresponding improvement of the lighting, except in the centre of the city. Some of the members cheered this statement, and others—possibly the members of the Finance Committee—received it with a cry of "Question." It is, however, significant that the local Press is by no means so enthusiastic about the electric light as in days when it was a novelty. One of the newspapers

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Gas out,
it is time
to Let out
the "EUREKA."

Is it on your
Hire List?

remarks that the brighter lighting of the central area is a good thing, but sagely questions whether it is worth an extra twopenny rate every year. It adds: "There are, of course, wheels within wheels. A docile public is penalized in this fashion in order that it may be flattered with the notion that the drain upon its resources in another direction is not unconscionable. Street lighting bears the burden that helps the electric light station to make a show of paying its way." It is taking "the docile public" a long time to find out how it is being misled in the matter of the so-called "profits" of a good many municipal undertakings; but there is room for hope that it will find it out now that the newspapers which it reads are beginning to clear their vision to the fact that the money is found by the ratepayer, and that it makes little difference to him whether it comes out of one pocket or another.

THE ELECTROLYSIS QUESTION IN AMERICA.

A recent number of the "Engineering Record" contained a short account of a trial in connection with the above subject which occupied the Court of Common Pleas of Montgomery County (Ohio) for about eight weeks. It was a dispute between the City of Dayton and the Dayton City Railway Company; and it involved many intricate and novel questions of law—some of them rarely, if ever, raised before—and the application of scientific principles never pronounced upon by Courts of Final Jurisdiction. About twenty expert witnesses were examined, a number of experiments were made in Court, and a remarkable collection of exhibits of pipes, pipe-joints, valves, charts, photographs, and so forth, was attached to the depositions. The substance of the decision of Judge O. B. Brown, as given by our contemporary, is as follows.

The use of the streets for water-works purposes is obtained by legislative authority; and the right of an electric railway to use the streets is from like authority. Each of these users is beneficial to the public, and each is entitled to enjoy its respective rights without interfering with the rights of the other; and no conflict can occur between the two if each remains within its own sphere, and exercises its power with due care and prudence.

The contract between the City and the Company, made in 1892, was for the construction, operation, and maintenance of a single trolley electric railway. This decision is reached by interpreting the franchise of the Company in the light of the work done in accordance with its terms under the supervision of the City Engineer.

A review of many decisions based on the legal motto, "Enjoy your own property in such a manner as not to injure that of another person," leads Judge Brown to the conclusion that where there are contract relations between the parties authorized by legislative grant, and there has been a proper exercise of such grant, by the use of due care, no cause of action will lie against the party so properly exercising such franchise or right under the contract or statute. The law will not permit the Court of Common Pleas, under the circumstances, to direct the adoption by the defendants of the double-trolley or conduit system, as demanded by the plaintiffs.

The facts determined are substantially as follows: (1) The soil underlying Dayton consists generally of 65 to 90 per cent. of gravel and 10 to 35 per cent. of loam and clay in about equal proportions. It contains a considerable amount of alkaline salts. It is conducive to moisture on account of its porosity, thus making it easily subject to electrolytic action; but it is not of a nature to cause corrosion similar to that on pipes affected by electrolysis. (2) Pipes buried in this soil remain unchanged for more than 30 years if not subject to electrolysis. It is admitted on both sides that there has been considerable electrolytic damage of water-pipes in Dayton. (3) It is admitted that this electrolytic action upon water-pipes is caused by the operation of a single overhead trolley railway. The testimony shows that the greatest damage has been done and is being done within a few squares of the power house, and much damage has been done to the lead service-pipes. (4) A complete remedy for damage by electrolysis is the double-trolley system, if perfectly maintained. The testimony shows that the single overhead trolley is the most practicable system of operation for general service. (5) The railway has been operated in a very inefficient and negligent manner, far below the present standard of the art. The bonding is very inadequate, and the system is lacking in the matter of return feeders.

The Judge decided that it was the duty of the Court to compel the defendant Company to introduce, within a reasonable time, such improvements that the operation of the single-trolley system authorized by the franchise and contract would be in accordance with the present standard for operating single-trolley roads; and the plaintiffs were to co-operate to this end.

NEWPORT (MON.) WATER SUPPLY.

The Wentwood Water-Works.

At the Meeting of the Newport Town Council on Thursday last, the presentation by Mr. T. Parry of the reports of the Water-Works Committee and Sub Committee, containing various details as to the progress of the works at Wentwood, the adoption of which he moved, gave rise to a good deal of discussion. Mr. Parfitt moved, as an amendment, that the report of the Sub-Committee be referred back, and contended that they were not worth the paper on which they were written. He complained of various "leakages" in the expenditure, and demanded an explanation. He was a member of the Committee; but when he asked for some particulars they were denied him, and he at once left the room. He should resign his seat on the Committee unless the figures were given to him. The reports were simply a farce, and misleading. He asked the Town Clerk whether, as a ratepayer, he was

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SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD.	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA.	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE.	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000

	Cubic Feet Daily.
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN.	1,000,000
PERNAMBUCO (Brazil)	125,000
MALTON	150,000
DULUTH, MINN. (Second Contract)	300,000

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entitled to have access to the papers, or whether as a member of the Committee he was entitled to the particulars. Mr. Wilkinson seconded the amendment. Mr. Gower said that if a tithe of what Mr. Parfitt alleged was true, he should support the amendment. Mr. Parry said the Committee had taken the charges brought by Mr. Parfitt *seriatim*. The Resident Engineer was present, and answered the questions put to him. He reviewed Mr. Parfitt's position, and said he (Mr. Parfitt) left the Committee before the end of the meeting. The Committee had had a report from Mr. Macdonald and had drawn up their report, which contained a pithy summary of Mr. Macdonald's report. He appealed to the Council to do nothing whatever to shake the confidence they had hitherto placed in the Committee. They simply refused to allow an outside auditor to look into the papers. Mr. Brown contended that Mr. Parry had not answered the allegations brought forward by Mr. Parfitt. It was stated that one man earned in one week £11 or £12 for contract work, while he also did some 40 or 60 hours' piece work at 1s. per hour. He hoped Mr. Parry could give them a satisfactory explanation. If not, he would have to move that the Council hold a very full inquiry into the matter. Mr. Parry read an extract from the report by Mr. Macdonald, showing that the man in question had been set to finish off some job by piecework, instead of an outsider being obtained to do it. Alderman Lloyd drew attention to the statement by Mr. Parfitt that a ganger was employed at £3 15s. per week, while he also contracted for horse work. Mr. Brown asked Mr. Parfitt to withdraw his amendment, in order that he might propose a full inquiry at a special meeting of the Council. Mr. Wilkinson objected, as seconder; and the amendment was put—only Messrs. Parfitt and Wilkinson voting for it. Mr. Brown moved that a special meeting be held to consider the matter; and this was carried *nem. con.* The meeting was held last Friday, when Mr. Parfitt moved that the reports of the Water-Works Sub Committee of the 11th and 25th of April be not adopted—giving in some detail his reasons for so doing. At the close of a long discussion, which was characterized by a member as "a storm in a teacup," the reports were adopted—only six votes being given in favour of Mr. Parfitt's proposition.

Tiverton Gas-Works Loan.—At a meeting of the Tiverton Town Council last Wednesday, the Borough Accountant (Mr. J. Siddalls) presented a report on the subject of the sinking fund for the gas-works loan. The works were purchased by the Corporation in 1897, and the term allowed for the repayment of the loan was 20 years. The actual accumulations in the sinking fund amount to £4804, against a sum of £3996 required by the Provisional Order to be accumulated. If the period for the repayment of the loan were extended by five years, the annual gain to the borough would be £320; and if an extension of ten years were granted, the saving would be £480, which could be either added to the reserve fund or applied to the reduction of the price of gas. It was decided that the Accountant should apply to the Local Government Board with a view to getting the period of the repayment of the loan extended.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday

The Broughty Ferry Town Council have this week settled their policy with reference to the charge for fitting up gas cookers and fires. The work used to be done by the Commissioners without expense to consumers; but this policy was set aside last year, and the cost of making connections was charged to the parties. In April, the question was again raised by notice of a motion to the effect that the policy be reverted to of making connections free. The subject was remitted to a Special Committee; and their report came before the Town Council on Monday. It was to the effect that, after having heard the Town Clerk and the Town Chamberlain upon the subject, they recommended that an annual charge of 5 per cent. of the cost of connections be made upon purchasers or hirers, who should also be required to give a guarantee that, in the event of their giving up the use of the connections, they should pay any balance remaining due. This was the recommendation of a Special Committee, following upon the advice of the Town Clerk and Town Chamberlain, all of whom probably have little knowledge of the working of gas undertakings. There is, therefore, no need for being surprised that the recommendation was opposed by Mr. Gilchrist, the Convener of the Gas Committee, who moved that it be not approved of. But which of the two policies is the wiser one, is a question which everyone must decide for himself. Mr. Gilchrist appeared to think that to charge only 5 per cent. annually was giving a favour to users of the apparatus. The desire, he said, was apparently to foster the consumption of gas. They had had an experience of this policy before (presumably when connections were made free); and it had led to the expenditure of a very large sum upon the extension of the gas-works. There was, in his opinion, no necessity for straining or putting forward inducements in the direction proposed. He had obtained figures from the Gas Manager (Mr. Forbes Waddell) which showed that from June 11 last until now no fewer than 129 gas appliances had been supplied. It was nonsensical, in his opinion, to energize to get people to use cookers and heaters, when applications were coming forward in a natural and legitimate way. Mr. Sim, who seconded, said that the Commissioners were setting aside 6¼ per cent. annually; and if they charged only 5 per cent., they would be losing 1¼ per cent. Mr. Gillies, who moved that the recommendation be adopted, said he thought the proposal was an honest and reasonable way of dealing with the matter, and was certainly a much more businesslike method than that of free connections. Mr. Lindsay, the seconder, argued that, having expended a large sum upon the gas-works, it was their duty to endeavour to sell as much gas as possible. They might have delayed extending the works; but they now had the plant, and circumstances were altered. Provost Gray supported the recommendation. He considered it was good policy to utilize their plant to the fullest extent possible. As regarded the proposed charge of 5 per cent., Mr. Sim had overlooked a little in his calculations.

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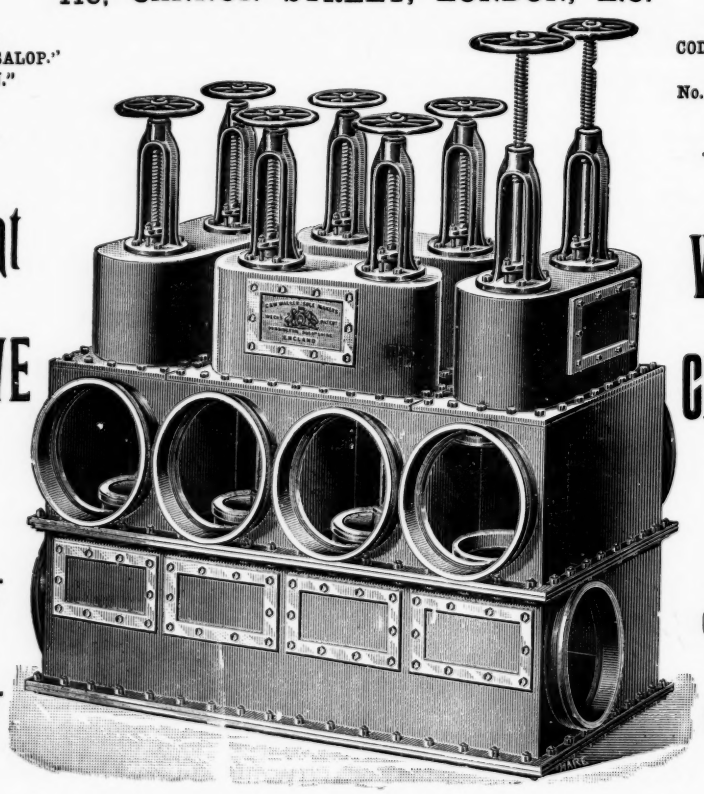

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The 6¼ per cent. which they set aside included sinking fund, and 3 per cent. more than met the interest. The recommendation of the Committee was adopted by seven votes to two. The proposal to have free connections was, apparently, never made. I think that Provost Gray's remark is not very clearly brought out, because the 6¼ per cent. is upon the revenue, whereas the 5 per cent. is to be upon the cost of the connections. This makes it apparent that Mr. Sims was not reasoning soundly. The subject has been handled with considerable heat in the Council; this being the third time it has been discussed with vigour. It seems as if the Gas Manager is in favour of making a full charge. Is it not the simpler way to make such a charge for apparatus, whether sale or hire, as will include the cost of connections, and to charge full price for removals? There is trouble in collecting charges, and more particularly so if the collections are to be made annually, as is now to be the case in Broughty Ferry. The Town Council have appointed Mr. Forbes Waddell Manager of their electricity department, at a salary of £50 for the first year.

Mr. A. C. Young, Manager to the Arbroath Gas Corporation, in a special report submitted this week, stated that the number of gas cookers and heaters in use in the town is small in proportion to the population; and he suggested that business in them should be pushed, as it would be profitable to the Corporation to have an increased consumption of gas during the summer months. He was of opinion that every facility and encouragement, by way of low first cost and low rentals, should be given to users of such apparatus. The Council, he thought, should consider as to the fixing of a cooker or griller free of cost to all coin-meter consumers who desired it. There are already 860 prepayment meters in use in Arbroath. The gas consumers number about 6000. Mr. Young's recommendations were unanimously adopted. This is the second time, since he went to Arbroath a few months ago, that Mr. Young has secured the unanimous approval of the Corporation to important proposals.

Another instance of what is beginning to be looked upon by public boards as tyranny on the part of officially-appointed auditors, is afforded by what took place at the Arbroath Town Council this week. The Auditor had stated his opinion that some of the accounts of the Council ought to be taxed by the Auditor of the Court of Session. After a meeting with the Auditor, a Committee resolved to recommend that certain accounts should be so taxed. When the matter came before the Town Council, it was explained that it had arisen out of an account charged by Mr. D. Chapel, who, till lately, was Clerk to the Gas Corporation; and that the Auditor maintained that the work charged for was included in Mr. Chapel's salary. The Council considered that, as Mr. Chapel only received the nominal salary of £20, and that he had a large amount of extra work last year, his account should be paid; but, in view of the attitude of the Auditor, it was agreed that the law accounts should be taxed in Edinburgh. Complaint was made as to the expense which this will entail; but there was felt to be no escape from the requirement of the Auditor, who, though nominally the servant, has made himself the master of the Corporation.

The Perth Town Council have this week considered the recommendation they adopted in Committee last week, to call in Mr. Newbigging to consider and report upon the complaints as to increased charges for gas and the reports of the Gas Manager and Gas Treasurer upon them. Bailie Wright thought that the Council were incapable of tackling the question, and that they should have the very best man possible to give them advice upon it. It was their duty to try to remove any misconception there might be among consumers. Mr. Macpherson, the author of the movement in the Council, thought that by calling in an expert they would have something definite and satisfactory to explain what at present was a mystery, not only to the overwhelming majority of the Council, but also to the public. It was moved, as an amendment, that a small Committee of the Council be appointed to consider the whole matter, with, if need be, the assistance of Mr. T. Whimster, the late Gas Manager at Perth. This sensible resolution only received five votes; whereas the proposed remit to Mr. Newbigging was carried by the support of twenty members of the Council.

The Kilmarnock Town Council have let the contract for the erection of a gasholder at their new works at Holm to Messrs. Clayton, Son, and Co., Limited, of Leeds, at the price of £4203. The construction of the tank was recently let to a local firm at £4263

Another action relating to the erection of the new Edinburgh and Leith gas-works at Granton was before Lord Stormonth-Darling in the Court of Session on Wednesday last. The pursuer is Mr. Alexander Forbes, jun., residing at No. 255, Gorgie Road, Edinburgh. He sues the Commissioners for seven sums, amounting to £523 3s. 11d., as balance due for work done. He says he was employed by the defenders to set the whole of the stonework of the retort-house, exhauster-house, coal-store, boiler-house, and plant-house, at the rate of 1s. 9d. per cubic foot. The first item sued for was £120 17s. 6d., for the stonework of the gables of the retort-house. This sum has been paid by the Commissioners, and is now out of the case. The averment of the pursuer is that the Commissioners erroneously take the net cubic measurements of the stonework as set by him, instead of the full cubic measurement of the stones. He maintains that, following the usual custom of the trade, he is entitled to payment according to the full cubic measurement. The defenders, it is said, refused to allow him to set the whole of the stonework, and to do other work which he was entitled to do. In defence, it is said that when the pursuer was asked to submit an offer for the setting of the stonework he was aware of the conditions under which it was to be done; and that he had a meeting with the Clerk of Works, who explained to him the nature of the work he was to offer for. The pursuer's offer was: To do the work at 1s. 9d. per cubic foot. This rate was considered by the Engineer to the Commissioners to be too high; and a proposal was made by the pursuer to reduce it to 1s. 6d. per cubic foot. This was also considered to be too high. Meantime, the pursuer was employed to do work at the rate of 1s. 9d. per cubic foot, with a view to the adjustment of a lower price. No formal contract was ever entered into. Throughout the whole course of the work, the pursuer, it is said, failed to proceed with it expeditiously; and the defenders, on different occasions,

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were obliged, after giving the pursuer notice, to put on workmen of their own to set stonework, in order to allow other contractors to proceed with their work, and to prevent injury to the brickwork from exposure to wet weather. It is maintained that the work should be paid for, according to custom, upon the basis of net measurement; and that the pursuer was aware that this was a condition of his employment. The defenders at no time undertook to have any particular part of their buildings erected in stone; and they never bound themselves to employ the pursuer in the execution of any particular piece of work. They maintain that the pursuer has received payment for all work executed by him for them as certified by their Engineer. In reply, the pursuer says he was instructed to proceed with the setting of the stonework in terms of his offer. He denies that he delayed the work; and he asserts that it was specially pointed out to him that the stonework would include a considerable part of the buildings which were afterwards erected in brick. Proof was ordered.

The only claim for damages which, so far, has resulted in litigation, arising out of accident in the course of the erection of the Granton gas-works, came before the First Division of the Court of Session in Edinburgh on Tuesday, when a formal order for the adjustment of issues for trial by jury was made. The action is directed against Messrs. Graham, Morton, and Co., Limited, of Leeds, and it concludes for the small sum of £250 at common law, or for £200 under the Employers' Liability Act. The pursuer—Michael O'Neil, who is a labourer—says he was employed by the defenders, who were contractors for the erection of the retort-bench and retort-house plant, and that on Jan. 14 he was working on the night shift. He was carrying a batten about 13 feet long over a gangway on the first floor in the retort-house, when the gangway tilted, causing him to lose his balance, and he fell to the ground, a distance of about 19 feet, sustaining an injury to his back. It is maintained that the gangway was defective and insufficient for its purpose; and that he was ignorant that it was so, having been only put to work at the place that evening. In defence, it is said that the pursuer grossly exaggerates his injuries; that the gangway was safe and sufficient for its purpose; and that the defenders offered compensation under the Workmen's Compensation Act.

The Town Council of Glasgow on Thursday accepted a number of tenders for gas-mains in connection with the new Provan gas-works. These were: Messrs. R. Laidlaw and Son, Limited, of Glasgow, 2000 yards of 36-inch and 2136 yards of 24-inch pipes, at the price of £5 12s. 6d. per ton; the Stanton Iron Works Company, Limited, 5200 yards of 36-inch and 700 yards of 30-inch pipes, at the price of £5 12s. 6d. per ton; and La Compagnie Générale des Conduites d'Eau, of Liége, 1000 yards of 36-inch pipes, at £5 13s. per ton.

The Corporation of Dunfermline on Monday had before them tenders for the erection of coal and coke handling plant in the gas-works, and a recommendation by the Gas Committee that, before proceeding with the work, they request Mr. A. Wilson, Manager of the Dawsholm station of the Glasgow Corporation, to visit the gas-works, examine the plans and specifications of the proposed works, and report as to their suitability. The Council approved of this.

The Glasgow Town Council on Thursday gave consideration to a minute of the Water Committee, containing a statement by the Water Treasurer as to the probable revenue and expenditure for the current and the ensuing financial year. For the current year, there was shown a surplus of £10,277; and for the year from May 31, 1902, to May 31, 1903, the estimated surplus is £12,326. The Committee proposed that no alteration should be made upon the rates. The Council adopted the minute.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 16.

Sulphate of Ammonia.

There has been good demand throughout the week, and keen competition for all ready parcels. The closing quotation f.o.b. Leith and Liverpool is £12 15s. per ton. There has been less demand at Hull, and the quotation at that point is nominally £12 7s. 6d.* per ton. Supplies continue to be extremely scarce, and there is only current production to meet all demands. Consumers abroad have still requirements to cover, and, as they have scarcely kept pace with the upward movement, they have only been able to secure a moderate proportion of current supplies. There is also considerable inquiry for shipment for the first half of June; but in this position buyers are seeking to get in at a discount on prompt prices. The forward position is again attracting much interest, and sales are reported to have been made f.o.b. Leith for October-March and October-May delivery at £11 15s. per ton.

[*By a printer's error, the Hull quotation last week was stated to be £12 15s. It should have been £12 5s.]

Nitrate of Soda.

This is quiet, but fairly steady, at 9s. 4½d. and 9s. 6d. per cwt., according to quality.

LONDON, *May* 17.

Tar Products.

Pitch continues in the same position. There is a very strong demand indeed, especially for small quantities for local consumption. Very inflated prices have been paid in London; but these were for small quantities, and can scarcely be taken as a criterion of the market for export. Some contracts are reported to have been made for January-June next year; and there are further inquiries for delivery all over 1903—some consumers evidently thinking that it may be wise to secure their supplies, even at the present high prices, rather than run the risk of being short later. In benzol, the slight improvement of last week has not been maintained. 90 per cent. is not worth more than 8½d.; and even at this, Continental consumers do not seem open to purchase. In 50-90 per cent., there is no business to report. Several small parcels have been offering without finding buyers. Solvent and toluol remain in the same position; there being no inquiry for either article for early delivery. Creosote is decidedly weaker in the North;

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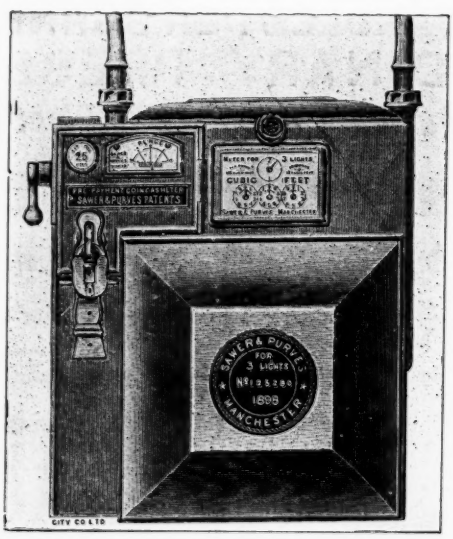

FOREMOST EVER SINCE.

SAWER & PURVES,

MANCHESTER.

several large parcels having been offered for early delivery at reduced prices. The demand for pickling has evidently not been so good in the North of England as was expected; so that several makers have rather heavy stocks towards the end of the season. There is a general opinion that later on the market may improve, as there are some large inquiries for export, although it is more than probable that these will be absorbed by the London makers. The position of anthracene remains unchanged. At the present price of "B" quality, it does not pay to produce same; and therefore the article has no actual value.

The average prices during the week were: Tar, 16s. to 21s. Pitch, London, 43s. to 44s.; east coast, 41s. 6d. to 42s.; west coast, 38s. to 38s. 6d. Benzol, 90 per cent., 8½d.; 50-90 per cent., 7½d. Toluol, 9d. Crude naphtha, 3d.; solvent naphtha, 9d. to 9½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1¼d.; North, 1d. Heavy oils, 1⅝d. Carbolic acid, 60 per cent., 1s. 11d. Naphthalene, 35s. to 50s.; salts, 21s. 6d. to 25s. Anthracene, "A," 1½d. to 1¾d.; "B," 1d. nominal.

Sulphate of Ammonia.

The market is very firm, and prices have a decidedly upward tendency; a very large business having been done during the past week at gradually improving values. In London, the Gaslight and Coke Company are reported to have sold a small quantity at £12 7s. 6d. for June delivery, while this price was also realized by another Metropolitan Company. For July-December, Beckton quotation is £12 5s. 1d., while for October-March they ask £11 15s.; but they are not anxious sellers at these prices—in fact, they are not making firm offers at same. In Leith, a very considerable business has been done for prompt and forward delivery. Contracts are reported at £11 15s. for October-March, while for prompt shipment sellers ask £12 15s. In Liverpool, very high prices are reported to have been paid for prompt, as much as £12 15s. having been realized, while business has been done for May-June at £12 10s. In Hull, the market has not been quite so excited; but sales are reported during the week at prices varying from £12 6s. 3d. to £12 10s., according to quality and position of shipment.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The Whitsuntide holidays, which in this district entail protracted stoppages of the pits—all the Manchester collieries closing for a full week, while in other portions of Lancashire there is a more or less general cessation of operations over three or four days—necessarily for the time being have a disorganizing effect upon trade. Apart, however, from some extra pressure from merchants and consumers to get in any supplies they may require before the holidays, which has given a temporary stimulus to the demand for pretty nearly all descriptions of fuel, there is no very material change in the position. For current sales of house-fire coals, prices in Lancashire are firm at reduced rates—averaging 13s. 6d. to 14s. per ton at the pit for best Wigan Arley, 12s. to 12s. 6d. for Pemberton four-feet and seconds Arley, and 9s. 6d. to 10s. for common house coal. But there is increasing keenness of competition from other districts, which scarcely favours anticipations of equal firmness after the holidays. The position with regard to steam and forge coals, though there is just now some extra demand, continues weak; and actual selling prices are considerably below the nominal list rates. Only in exceptional cases is more than about 8s. 6d. per ton at the pit obtained for steam and forge coals. Gas coal contracts are being gradually settled at much about the prices reported last week—ranging from 9s. per ton at the pit for the commoner sorts, up to 10s. for best screened Arley gas coals. This is a reduction of about 1s. 6d. per ton on common and 1s. on best sorts, as compared with last year. Though one or two Lancashire coalowners have been able to get about 8s. 3d. per ton on locomotive fuel contracts generally, in Lancashire these are being settled on the basis of 8s. per ton at the pit, for which the railway companies have held out; and it is reported that considerable quantities have been bought in other districts at substantially under this figure. The best sorts of engine fuel are still meeting with a ready sale, and maintaining their price, at about 6s. 6d. to 7s. per ton at the pit. Inferior sorts, however, are plentiful, and have to meet very keen competition from outside districts, which causes prices to be so irregular that there is scarcely any really definite list rate which is adhered to. Shipping demand has been fairly good; but prices are low, at 9s. 6d. to 10s. per ton for steam coals, delivered at the ports on the Mersey. For coke there is a continued good demand, with prices strong at late rates. The attitude which is taken up by the miners in declining to endorse the provisional agreement of their representatives for a reduction of 10 per cent. in wages, and preferring to submit the matter to arbitration, has been unexpected, and may have an unsettling effect for the present, with possibly a tendency to check for the moment any further downward movement in prices. But it is very doubtful whether, in the end, the question will be submitted to arbitration, as the miners' officials much prefer to settle such matters between themselves and the coalowners.

Northern Coal Trade.

With the holidays near, there is the usual addition to the demand; and the fact that the Baltic ports are now open has given some further stimulus, though there is the opposite factor in the fall in the local consumption usual at this time of the year. In the steam coal trade there is a fuller demand. Best Northumbrian steams are from 11s. to 11s. 6d. per ton f.o.b., second-class steams are quiet at 10s., and steam smalls are 5s. 6d. to 5s. 9d.—the latter being a little more plentiful. In the gas coal trade, more local contracts are now in the market, including that of Stockton, for 40,000 tons of gas coals. Prices vary more than they did; and from 8s. 6d. to 9s. 6d. per ton f.o.b. may be looked on as the prices, according to quality, for Durham gas coals. In the coke trade, best Durham coke for export is about 17s. per ton f.o.b. Blast-furnace coke is from 15s. 3d. to 15s. 6d. free on Tees-side. Gas coke varies more in price; some gas companies wishing to lessen stocks. The production, however, is now less, and shipments

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are rather better. Possibly, the prices may on the average be from 10s. 6d. to 11s. per ton f.o.b.; but there is, as stated, greater variation, according to the amounts held.

Scotch Coal Trade.

It is difficult to gauge the market at present. On the one hand, it is being given out that, except for all of the best quality, and for nuts and dross, the demand is quiet, that it is particularly quiet for steam coal; while, on the other hand, exports are going up. Probably the question of the miners' wages, which is under consideration at the present moment, has something to do with the desire to depreciate trade. The prices quoted are: Main, 8s. 3d. to 8s. 6d. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s. 3d., and splint 9s. 3d. to 9s. 6d.—which shows a reduction of 3d. upon splint, but no change upon the others. The shipments for the week were 227,631 tons—an increase of 3371 tons upon the previous week, and of 10,464 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,396,981 tons—an increase of 298,502 tons upon the same period of last year.

Deal and Walmer Gas Company and Discounts.—The Chairman of Ways and Means of the House of Commons has reported from the Committee on the Bill of the above-named Company that a report from the Local Government Board relative to clause 31 of the Bill, relating to discounts, had been considered by the Committee, to whom it appeared that the power to allow discounts to consumers at a rate not exceeding 20 per cent., as proposed, was a reasonable one, and might be sanctioned. They added that provision had been made in the clause, during the progress of the Bill through the House of Lords, for notice being endorsed on the demand-notes of discounts or rebates in consideration of prompt payment being allowed by the Company.

Wilmslow and Alderley Edge Gas Company.—The annual meeting of this Company was held last Thursday, at the offices in Manchester. From the report of the Engineer and Manager (Mr. W. Severs), which was adopted, it appeared that 52,389,000 cubic feet of gas had been made during the past year; being an increase at the rate of 11·11 per cent. on the preceding period. The profits available for distribution, amounting to £2285 3s. 11d., enabled the Directors to recommend the maximum dividends of 10 per cent. on the old, and 7 per cent. on the new shares of the Company, and to carry forward a balance of £18 14s. 6d. The results were considered highly satisfactory by the shareholders, who passed a hearty vote of thanks to the Directors and the officers of the Company for their services during what was characterized as one of the most trying and difficult years in the history of the gas industry. The record of this Company has been one of healthy growth for some years. In 1896, when Mr. Severs was appointed, the make was 28,621,800 cubic feet; whereas last year, as stated above, it was 52,389,000 cubic feet—an increase of 23,767,200 cubic feet.

Bolton Corporation Water Supply.—The income of the Water Department of the Bolton Corporation for the past financial year was £67,583, or £1580 more than in the preceding twelve months; while the expenditure was £53,000, against £51,464. The twelve months' working will enable the Water Committee to hand over £14,000 in relief of the rates.

Gas Profits at Chorley.—The profits of the Chorley Corporation Gas Department last year amounted to £4753, the highest figures ever recorded. Owing to this fact, special items of expenditure for a recreation-ground and for the Coronation festivities will be covered by the improvement rate, without any increase; £1000 of the above-named amount having been allocated in relief of the rates.

Stalybridge Gas Supply.—The Gas Committee of the Stalybridge Town Council have decided to raise the price of gas to 2s. 8d. per 1000 cubic feet, owing to a falling off in the revenue to the extent of £1150. In consequence of the extraordinary charges which have arisen through the recent explosion at the purifier-house at the gas-works, the Town Clerk has been instructed to get sanction to appropriate £2000 from the gas-works funds to the insurance fund.

Exmouth Water-Works Purchase.—The Exmouth District Council have now completed the purchase of the water undertaking. The money awarded to the Company—£67,533—has been raised on mortgage, and immediately on its receipt by the Council was paid over to the Company. It has been decided that the Surveyor shall be Manager of the works, though a large number of the members were in favour of the acceptance of an offer by the late Manager (Mr. G. Beavis) to undertake the work for a year without payment.

Economy of Modern Pumping Machinery.—The Corporation of Worcester have recently erected some new steam-engines and pumping machinery in connection with the water supply to that city, which illustrate the advantages of modern methods. The interest and repayment of loan (rather less than £12,000) amount to about £620 per annum, and the City Engineer (Mr. T. Caink) estimates that the economies to be effected by the use of the new plant will not only provide for this, but save £570 per annum. The saving in stokers' wages is £170; in fuel, £400; in repairs, £150; and in electric current, £470—total, £1190 per annum.

Chard Gas-Works Question.—The subject of the purchase of the gas-works was further considered by the Chard Town Council at a special meeting held on Tuesday last. In the course of the discussion, the Mayor (Alderman F. H. Mitchell) said the town would probably save 20 per cent. on the cost of the undertaking if they took steps to buy now instead of waiting until the purchase clause had ceased to operate. Gas should be cheaper if supplied by the Corporation, who could borrow money at from 3½ to 3¾ per cent., instead of by the Company, who had to pay 5, 7, and 10 per cent. on their capital. A resolution in favour of the purchase of the undertaking was passed, and a statutory meeting of the ratepayers is to be held to confirm this decision.

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The Directors of the Continental Union Gas Company, Limited, have resolved to pay an interim dividend on the ordinary stock of 4 per cent. for the half year.

Messrs. Joseph Taylor and Co., of Bolton, have received from the St. Annes-on-the-Sea Gas Company an order for one of their best and latest build of solid plate lead saturators, braced with pitch pine laggings, and fitted with double detachable ammonia pipes and acid pipe.

The Universal Gas-Iron Company, Limited, has been registered with a capital of £2000, in £1 shares, to acquire a patent for improvements relating to hand-irons for laundry and other purposes, granted to Mr. J. W. Blakey, and an invention for improvements in gas-heated smoothing-irons for laundry purposes.

At the last meeting of the West Hartlepool Town Council, it was reported that the total cost to the two Corporations of the applications to Parliament for power to purchase the Hartlepool Gas and Water Company's undertaking amounted to £2947, of which Hartlepool had to pay £691 and West Hartlepool £2956.

Messrs. Robert Dempster and Sons, Limited, of Elland, have received an order from the Meltham Urban District Council for a new gasholder 70 feet in diameter by 20 feet deep, prepared for telescoping. The work is being carried out under the supervision of Mr. J. H. Brearley, the Consulting Engineer to the Council.

The Manchester Corporation have placed with Messrs. J. Blakeborough and Sons, of Brighouse, the order for the special 40 inch sluice-valves, also for the air-valves, washout-valves, surface-boxes, &c., required in connection with the second line of water-pipes from Thirlmere to Manchester. This firm also supplied similar goods for the first line of pipes, laid 14 years since.

At the meeting of Meters Limited next Tuesday, the Directors will report that the trading in the year ending the 31st of March resulted in a gross profit of £34,720. The net profit amounts to £22,275, out of which interim dividends, at the rates of 5½ per cent. per annum upon the preference shares and 5 per cent. per annum upon the ordinary shares, were paid in November last; and the Directors recommend that further dividends at the rates of 5½ and 6 per cent. per annum be paid (making the ordinary dividend 5½ per cent. for the year); that £6000 be added to reserve fund; and that the balance of £2111 be carried forward to next year's accounts.

An interesting exhibition of Messrs. Fletcher, Russell, and Co.'s gas cooking-ranges and other gas appliances was held recently, under the auspices of the Guildford Gas Company. Cookery lectures were given twice each day by Miss H. Edden; and an interesting feature of the exhibition was the very strong light given by the new and improved "Lucas" intensified incandescent lamps, one of which was fitted in the hall, while another attracted considerable notice at the entrance. For these lamps (which the Gas Company are prepared to supply at reasonable prices) it is claimed that a 700-candle power light is given for a consumption of 17 cubic feet per hour. A few particulars showing the growing popularity of gas-cookers, penny-in-the-slot meters, &c., in Guildford, given by the Secretary (Mr. William Titley) may be of interest. Six years ago there were only 120 gas cookers on hire by the Company; whereas at the present time the number is nearly 1200—one in every third house. During the same period the number of gas-engines has increased from 26 to 56. There are 700 cookers worked in connection with the penny-in-the-slot meters in the homes of the working classes in the town; and the number of these meters is continually increasing. Last year alone the Company took 340,000 pennies out of the meters.

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BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.
MELROSE CYCLE COMPANY, COVENTRY.

STREET LAMPS AND LANTERNS.

MARK DUFFIELD & SONS, Engineers and Contractors to the Principal Home and Foreign Gas and Electric Companies, invite inquiries.
London Manager, EDWARD PADFIELD, 27, Leadenhall Street, E.C. Telegrams: "Eupathy, London."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

COAL GAS TAR wanted.
State Quantity to offer for Prompt and Forward Delivery.
The SHARPNESS CHEMICAL COMPANY, Tar Distillers Sharpness Docks, GLOS.

Telegrams: "BALEFIRE LONDON."

BALE & CHURCH, Late of Bale & Co.,
OXIDE of IRON, METERS, FIRE-CEMENT PAINT, &c.
5, CROOKED LANE, CANNON STREET,
LONDON, E.C.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

WANTED, re-engagement as Working MANAGER of small Gas-Works. Practical Carbonizer, Gas-Fitter, Main and Service Layer, &c. Age 49. Abstainer. Excellent Testimonials.
Address No. 3862, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

WANTED, Three good Retort Setters, used to Inclined Settings. Good Wages given to competent men.
Apply to A. A. HARDY, 7, St. John's Terrace, SOUTHALL.

DRAUGHTSMEN wanted, experienced in Air Compressors and General Engineering.
State Age, Experience, and Salary required, to W. J. JENKINS AND CO., LTD., Engineers, RETFORD.

PREMIER Firm of Gas Apparatus Manufacturers require the services of an energetic, capable, and experienced MAN with workshop training to superintend the manufacture of Wet and Dry and Prepayment Meters and Gas Apparatus.
Apply by letter, in confidence, giving full Particulars of Experience and Views as to Salary, to No. 3863, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, three Gas-Fitters, Single Men only, for South Africa. Commencing Salary 10s. a day.
Apply, stating Experience, to No 3856, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN required; also well- trained JUNIORS. Permanent situation if satisfactory.
Apply, stating Age, previous Experience, and Salary expected, to S. CUTLER & SONS, MILLWALL, E.

WANTED, by the Whitehaven United Gas Company Limited, a FOREMAN able to take charge of the Works. Must be a thoroughly reliable Man, and accustomed to Generator Furnaces, the making of Sulphate of Ammonia, and the general routine of a Gas-Works. Make 55 Millions. Salary £80 per annum.
Apply, giving References, to J. H. STUDHOLME, Secretary.

BOROUGH OF LOUGHBOROUGH.
(GAS DEPARTMENT.)

THE Gas Committee of the Corporation invite APPLICATIONS for the Appointment of a CLERK competent to keep the Books and Accounts connected with their Gas Undertaking.
Applicants for the position must possess a thorough practical knowledge of Book-keeping and the clerical work pertaining to such Undertaking.
The salary will commence at the rate of £120 per annum, to be increased by annual increments to £150 per annum providing the services of the person appointed prove satisfactory.
Applications, accompanied by *copies* of not more than three Testimonials of recent date (which will not be returned), and stating Age and Experience, to be forwarded to the undersigned not later than Tuesday, the 27th inst., endorsed "Gas Clerkship."

HARRY PERKINS,
Town Clerk.

Town Hall, Loughborough,
May 14, 1902.

BOROUGH OF RAMSGATE.
GAS AND WATER ENGINEER.

THE Council invite applications for the position of ENGINEER and MANAGER of the Gas and Water Departments, which will be vacant on the 25th of September next. Applicants must have had previous experience in the duties of both Departments. The annual Salary will be £500; and Staff and Offices will be provided by the Council. The gentleman appointed will not be allowed to carry on private practice, but will be required to devote his whole time to the duties of his office.
Applications, stating the Age and Experience of the candidate, and accompanied by not more than four recent Testimonials, to be sent, addressed to the undersigned and endorsed "Engineership," on or before the 7th of June, 1902.
In addition to the formal application, twenty-five prints of the same and of the Testimonials should be forwarded for the information of the Council.
Canvassing members of the Council is strictly prohibited, and will disqualify the person pursuing it.

W. A. HUBBARD,
Town Clerk.

Municipal Offices,
Ramsgate, May 13, 1902.

AMMONIACAL Liquor, 6° Twaddel, about 2000 Gallons for Sale. OFFERS requested put on rail in purchaser's own barrels.
Address MANAGER, Gas-Works, Godstone Station, S.E. & C. Ry.

SPECIAL OFFER of Gas Purifiers.
Six Perfect 20 feet Square PURIFIERS, planed Joints, Lutes 2 feet deep, made to Newbigging's Specification. Bargain to early Purchasers.
FIRTH BLAKELEY, DEWSBURY.

TO BE SOLD—
10-inch SCRUBBER-WASHER, by Clapham, overhauled and perfect.
12-inch SCRUBBER-WASHER, by Holmes, overhauled and perfect.
FIRTH BLAKELEY, DEWSBURY.

CONDENSER for Sale—Morris and CUTLER'S "PERFECT;" capacity 250,000 cubic feet per 24 hours. In perfect condition. New in 1888, and recently retubed.
Apply to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

GAS PLANT for Sale of all kinds.
GASHOLDERS, 15 ft. to 50 ft. diameter.
Iron or Steel TANKS for ditto.
SCRUBBERS AND WASHERS, by Holmes, Clapham, &c.
CONDENSERS—Pipe, Annular, and Patent Condensers.
PURIFIERS, from 4 ft. to 20 ft. square.
RETORT-FITTINGS, METERS, GOVERNORS, VALVES, &c.
Every Description of NEW PLANT supplied.
FIRTH BLAKELEY AND CO., Gas Engineers, DEWSBURY.

TO BE SOLD—
GASHOLDER, 14 ft. by 10 ft. with 3 Columns and Suspension.
GASHOLDER, 16 ft. by 10 ft. with 4 Columns.
GASHOLDER, 20 ft. by 10 ft. with 4 Columns and Suspension.
GASHOLDER, 30 ft. by 12 ft. with 4 Columns.
GASHOLDER, 43 ft. by 14 ft. with 5 Columns and Suspension.
GASHOLDER, 45 ft. by 14 ft. with 5 Columns and Two Lift.
GASHOLDER, 80 ft. by 20 ft. with 10 Columns Two Lift.
Write J. WRIGHT, 181, Queen Victoria Street, E.C.

FOR SALE—Gas-Works, doing the public and private Lighting in a Town of about 2500 inhabitants in a Western County. No Provisional Order. Average Net Actual Profits for last seven years, nearly £250.
Apply to Messrs. WADE-GERY & BRACKENBURY, Solicitors, St. Neots, Hunts.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill DEWSBURY.

STOCKTON-ON-TEES CORPORATION.
RETORT-SETTINGS.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the Construction of ten beds of through RETORTS on the Regenerative Principle.
Particulars may be had on application to the undersigned.

WILLIAM FORD,
Manager.

Corporation Gas-Works,
Stockton-on-Tees.
May 9, 1902.

STOCKTON-ON-TEES CORPORATION.
TENDERS FOR GAS COAL.

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the supply in whole or part of 40,000 Tons of GAS COAL for the Year ending March 31, 1903.
TENDERS, sealed and endorsed "Tenders for Gas Coal," to be sent in not later than noon of the 23rd day of May, 1902, addressed to the undersigned, at the Gas-Works, from whom Forms of Tender, &c., can be had.
The Gas and Electricity Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM FORD,
Manager.

Corporation Gas-Works,
Stockton-on-Tees.

STOCKTON-ON-TEES CORPORATION.
METERS AND COOKERS.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply of the METERS and COOKERS that may be required by the Department during the Year ending March 31, 1903.
Particulars may be had on application to the undersigned.
Tenders, to be endorsed "Tender for Meters" or "Cookers."

WM. FORD,
Manager.

Corporation Gas-Works,
Stockton-on-Tees,
May 10, 1902.

BOROUGH OF RICHMOND, SURREY.
(WATER-WORKS.)
WATER-MAINS.

TENDERS are invited for the supply of 470 4-inch Cast-Iron SPIGOT and SOCKET PIPES, 9 feet lengths, to weigh 14 cwt. each Pipe, coated with Dr. Angus Smith's Composition, and delivered free of all charges at the Water-Works Wharf on the River Thames, or at the Railway Station, Richmond, Surrey.
Particulars and Forms of Tender can be obtained of Mr. W. G. Peirce, Engineer, at the Water-Works.
Tenders to be delivered at the Town Hall, Richmond, Surrey, by Ten a.m. on Monday, May 26, addressed to the Chairman of the Water Committee, and endorsed "Tender for Cast-Iron Pipes."

F. B. SENIOR,
Town Clerk.

Town Hall, Richmond,
Surrey, May 6, 1902.

BOROUGH OF RICHMOND, SURREY.
(WATER-WORKS AND PUBLIC BATHS.)
TENDERS FOR SMOKELESS WELSH STEAM COAL.

THE Town Council of the Borough of Richmond, Surrey, invite TENDERS for the supply of about 1500 Tons of best WELSH SMOKELESS STEAM COAL, to be delivered in Barges of about 40 Tons alongside the Wharf opposite the Water-Works, Richmond, for One Year from the 1st day of July 1902, to the 30th day of June, 1903.
The Seam and District from which the Coal is to be supplied must be stated in the Tender.
Particulars and Forms of Tender can be obtained of Mr. W. G. Peirce, Borough Water-Works Engineer, at the Water-Works.
No Tender will be recognized unless it is made on the prescribed Form, properly filled up in every respect, and no expenses or claim will be allowed or paid to any per on whether tendering or not.
The security stipulated by the Public Health Act, 1875, for the due performance of the Contract will be required.
The Contract and Bond will be prepared by the Town Clerk.
Sealed Tenders, endorsed "Tender for Welsh Coal," and addressed to the Chairman of the Water Committee, Borough of Richmond, Surrey, must be delivered at the Town Clerk's Office, by Ten o'clock on Monday, the 26th of May, 1902.
The Council do not bind themselves to accept the lowest or any Tender.

FRYDK. B. SENIOR,
Town Clerk.

Town Clerk's Office,
Town Hall, Richmond, Surrey,
May 6, 1902.

OXFORD GASLIGHT AND COKE COMPANY.

THE Directors invite Tenders for the supply of about 33,000 Tons of best screened GAS COAL, to be delivered to their Siding, G.W.R., during the Year ending June 30, 1903.
Tenders, addressed to the Chairman of the Oxford Gaslight and Coke Company, and endorsed "Tender for Coal," to be delivered by June 10, 1902.

By order,
JAMES ELDRIDGE,
Engineer and Manager.

CITY OF CARLISLE.

THE Gas Committee of the Carlisle Corporation are prepared to receive TENDERS for the RE-SHEETING of a TWO-LIFT GAS-HOLDER, 60 ft diameter and 18ft deep, at their Works.
Tenders, endorsed "Gasholder," to be forwarded to the Office of the Town Clerk, addressed to the Chairman of the Gas Committee, not later than May 27, 1902.

By order,
A. H. COLLINGWOOD,
Town Clerk.

Carlisle, May 15, 1902.

CITY OF CARLISLE.

THE Carlisle Gas Committee are pre pared to receive TENDERS for the purchase of the surplus TAR produced at their Works for a period of One Year from the 1st of July next.
Tenders, endorsed "Tar," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk, not later than June 2, 1902.
Further Particulars can be obtained on application to W. J. Smith, Engineer and Manager.

By order,
A. H. COLLINGWOOD,
Town Clerk.

Carlisle, May 15, 1902.

CITY OF CARLISLE.

THE Carlisle Gas and Water Committee are prepared to receive TENDERS for the COAL and CANNEL required at their respective Works during One Year from the 1st of July next.
Tenders, endorsed "Coal," and addressed to the Chairman of the Gas and Water Committee, to be delivered at the Office of the Town Clerk not later than June 2, 1902.
Forms of Tender and other Particulars may be had on application to W. J. Smith, Gas Engineer and Manager, for Gas Coal; and H. C. Marks, Water Engineer, for Coal for Water-Works.

By order,
A. H. COLLINGWOOD,
Town Clerk.

Carlisle, May 15, 1902.

RAMSGATE CORPORATION.
(GAS, WATER, AND ELECTRICITY DEPARTMENT.)

THE Gas, Water, and Electricity Com- mittee invite TENDERS for the supply of best quality soft caking and gas-producing screened Durham or other COAL, in three annual quantities of 22,000, 24,000, and 26,000 Tons, delivered free into carts on the Quay at Ramsgate Harbour, or free into the Stores at the Gas-Works. The first quantity of 22,000 Tons to be delivered in equal monthly quantities between the 1st of July, 1902, and the 30th of June, 1903; the second and third years' supplies also in equal monthly quantities between the 1st of July, 1903, and the 30th of June, 1904, and the 1st of July, 1904, and the 30th of June, 1905. A distinct price to be named for each annual quantity.
Tenders to be sent in not later than Ten a.m., on Monday, the 26th inst., addressed to the Chairman of the Gas, Water, and Electricity Committee, Boundary Road, Ramsgate, endorsed "Coals."
The Committee do not bind themselves to accept the lowest or any Tender.
Full Particulars and Form of Tender on application to the undersigned.

WILLIAM A. VALON,
Engineer.

BOROUGH OF WALSALL.
TENDERS FOR GAS COAL.

THE Corporation of Walsall invite TENDERS for the supply of 35,000 tons of Staveley, Yorkshire, or any other good GAS COAL, and 15,000 tons of screened GAS NUTS, to be delivered during One year from the 1st of July next, at the Corporation Siding at the Pleck Gas-Works, Walsall, as may be required.
Forms of Tender and Specification may be obtained on application to the undersigned.
The Corporation do not bind themselves to accept any Tender; and they reserve the right to divide the Contract between several firms.
Tenders, sealed and marked outside "Tender for Gas Coal," and stating the price for large Coal and also for Nuts, are to be sent to the undersigned on or before Wednesday, the 11th of June next.

JOHN R. COOPER,
Town Clerk.

Borough Offices, Walsall,
May 14, 1902.

TO LIME MASTERS.

THE Corporation of Walsall invite TENDERS for the supply of about 1000 Tons of LIME, which will be required at their Gas-Works during One Year from the 1st of July next; the deliveries to be in such monthly quantities as the Manager of the Gas-Works may from time to time direct.
The Lime is to be hand-picked, and clear from refuse and ashes, and to be delivered at the Corporation Siding at the Pleck Gas-Works as required.
Payments monthly.
Tenders, sealed and marked outside "Tender for Lime," are to be sent to the undersigned on or before Wednesday, the 11th of June next.

JOHN R. COOPER,
Town Clerk.

Borough Offices, Walsall,
May 14, 1902.